Technology

Gas Journal

VOL. 282. 107th YEAR. LONDON, APRIL 20, 1955 Nº 4794. PRICE 1/3

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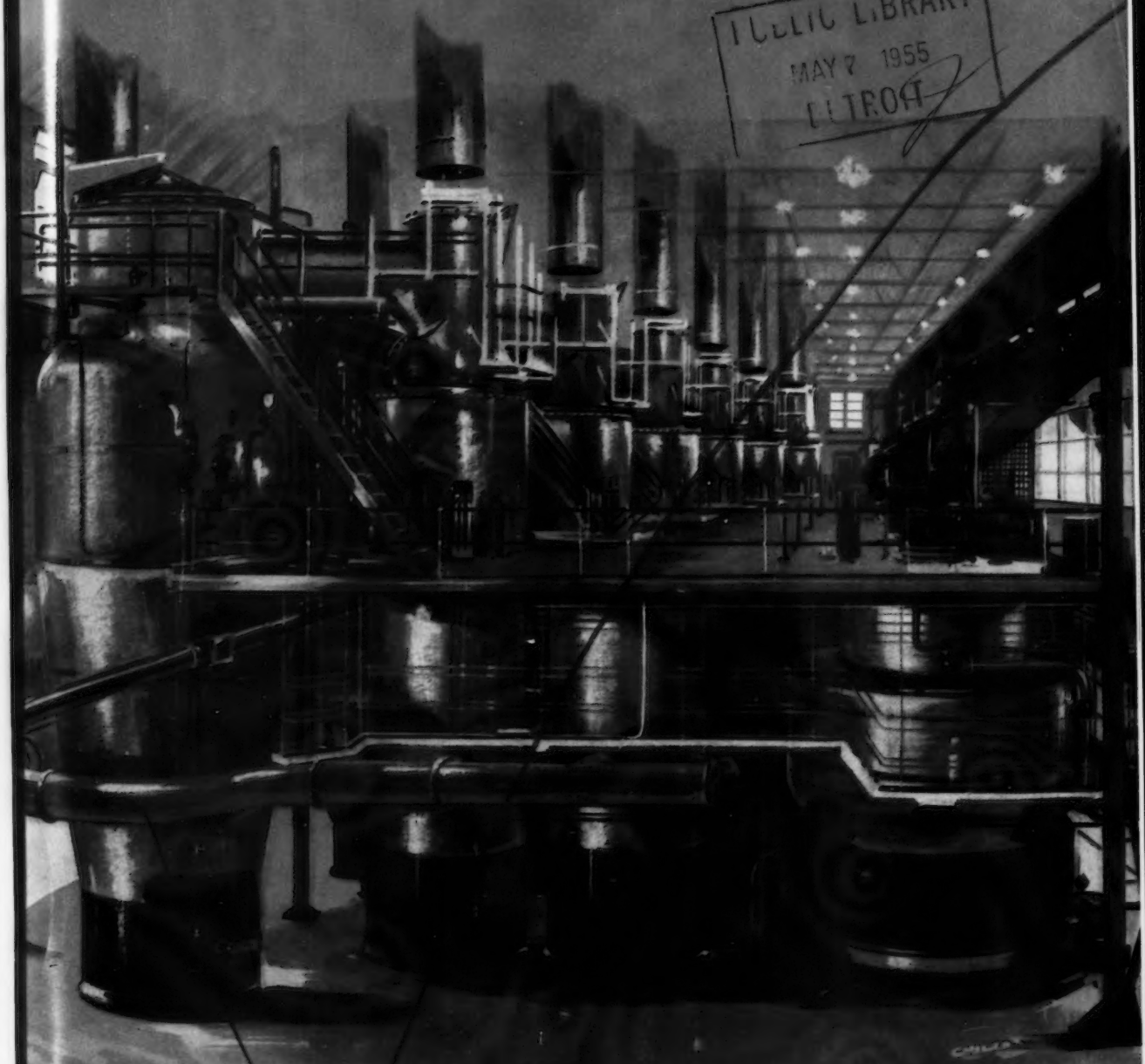

Installation of Carburetted Water Gas Plant for the South Eastern Gas Board at their East Greenwich Gas Works. Present capacity 21,000,000 cubic feet per day. Ultimate capacity 28,000,000 cubic feet per day.

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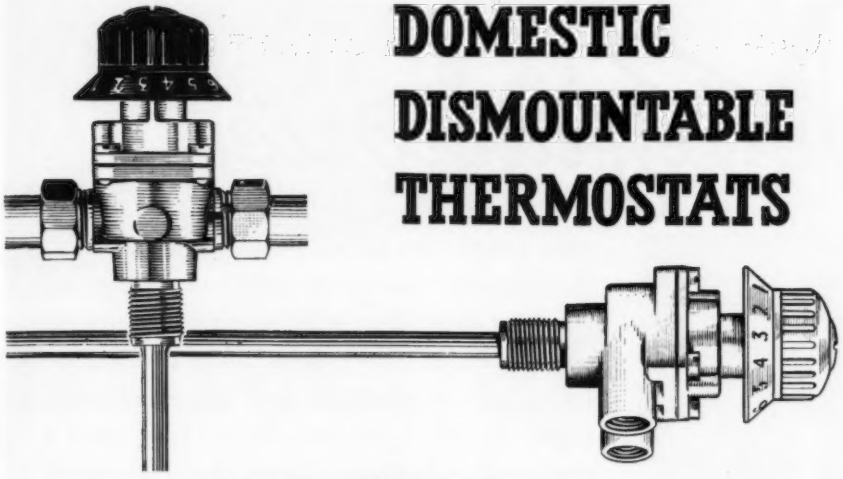

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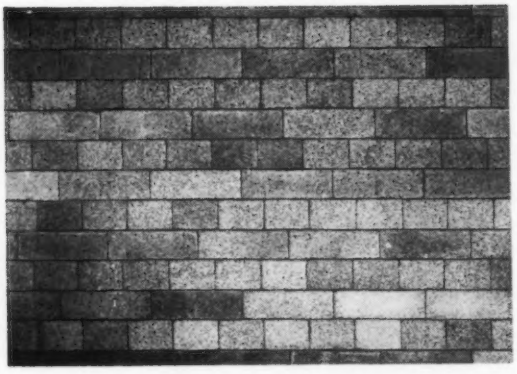

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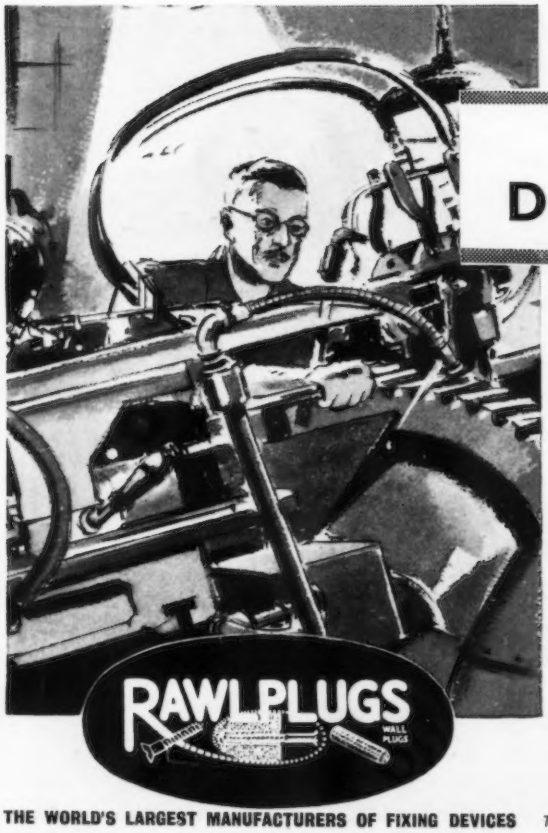

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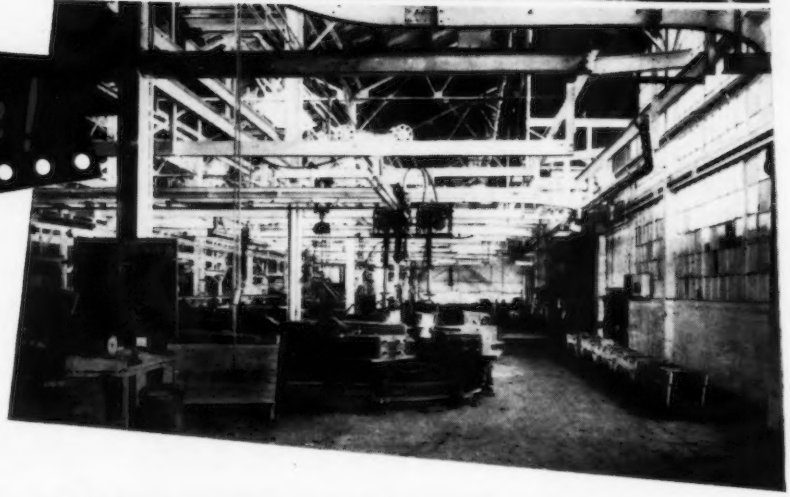

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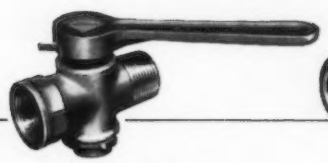
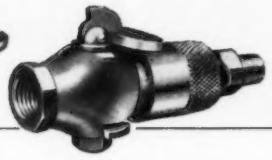
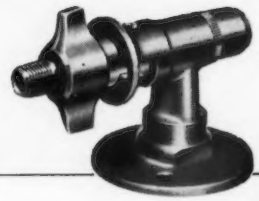


M & F Main Cock with Iron Key.



"Simflex" Drop Lever Cock with plug in Connector



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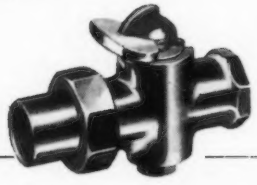
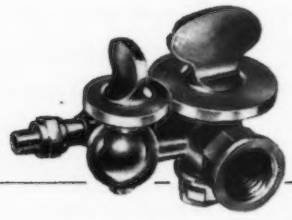


Union Cock with drop lever.

Gas Fire Cock with loose key, flanged for floor fixing.



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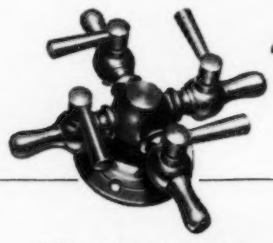
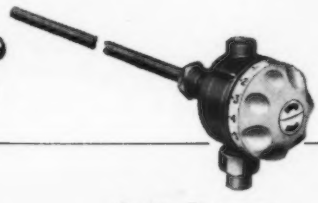


4 Way Laboratory Bench Cock, for Laboratory use.



Cooker Thermostat White plastic head with figures marked in black.

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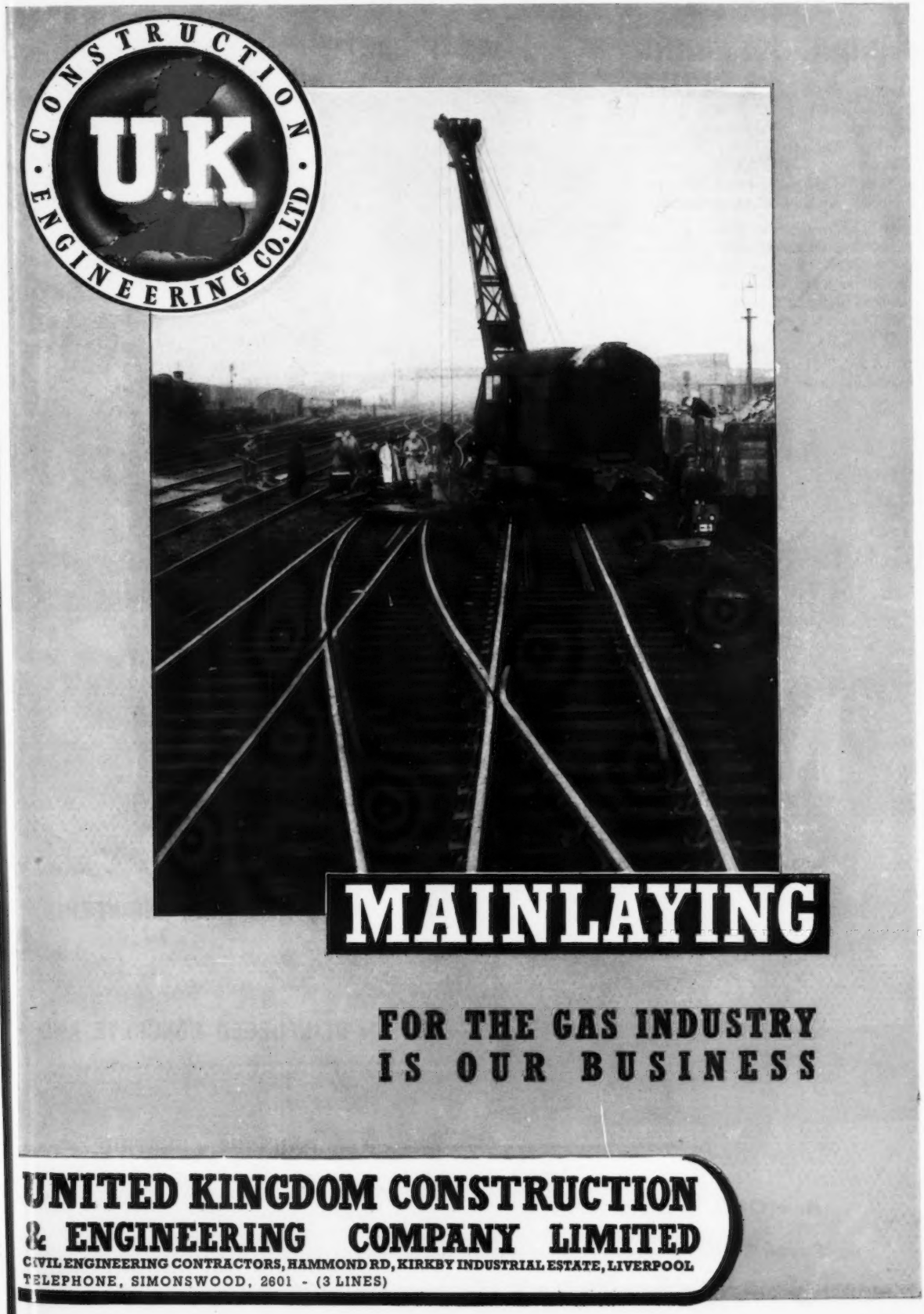
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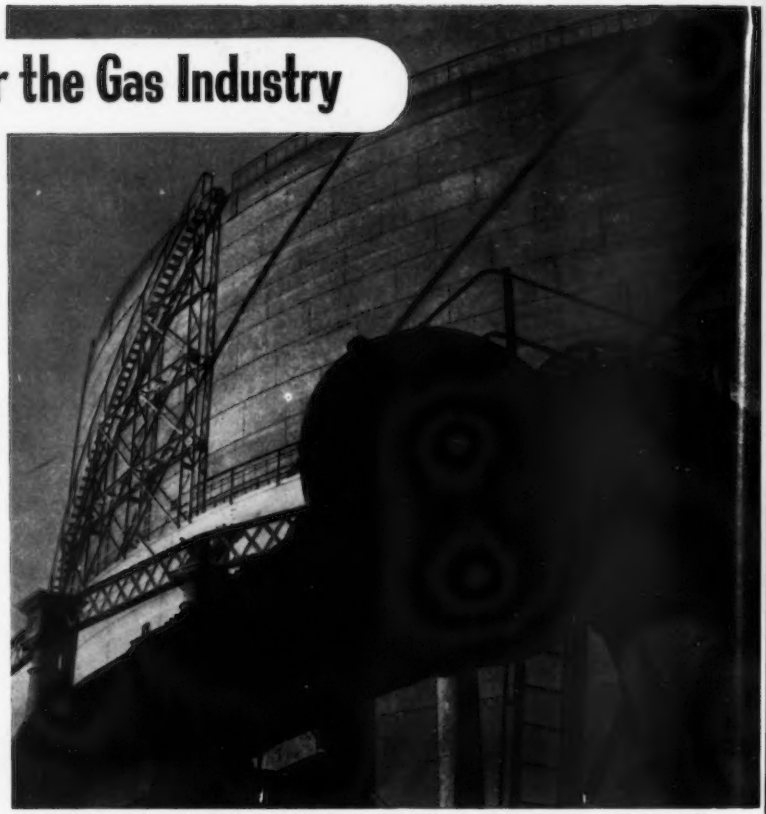
Photograph by courtesy of the Gas Council



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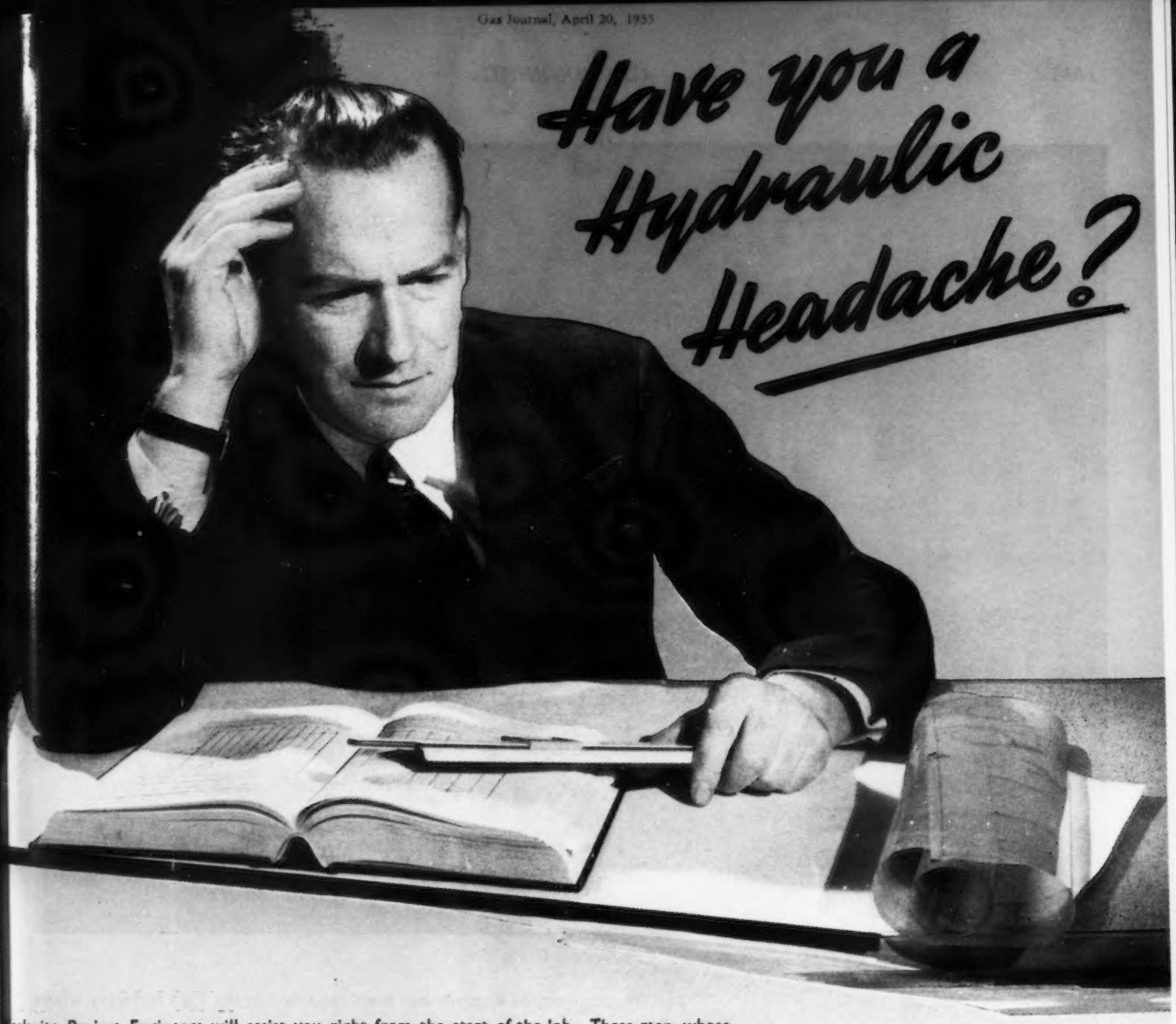

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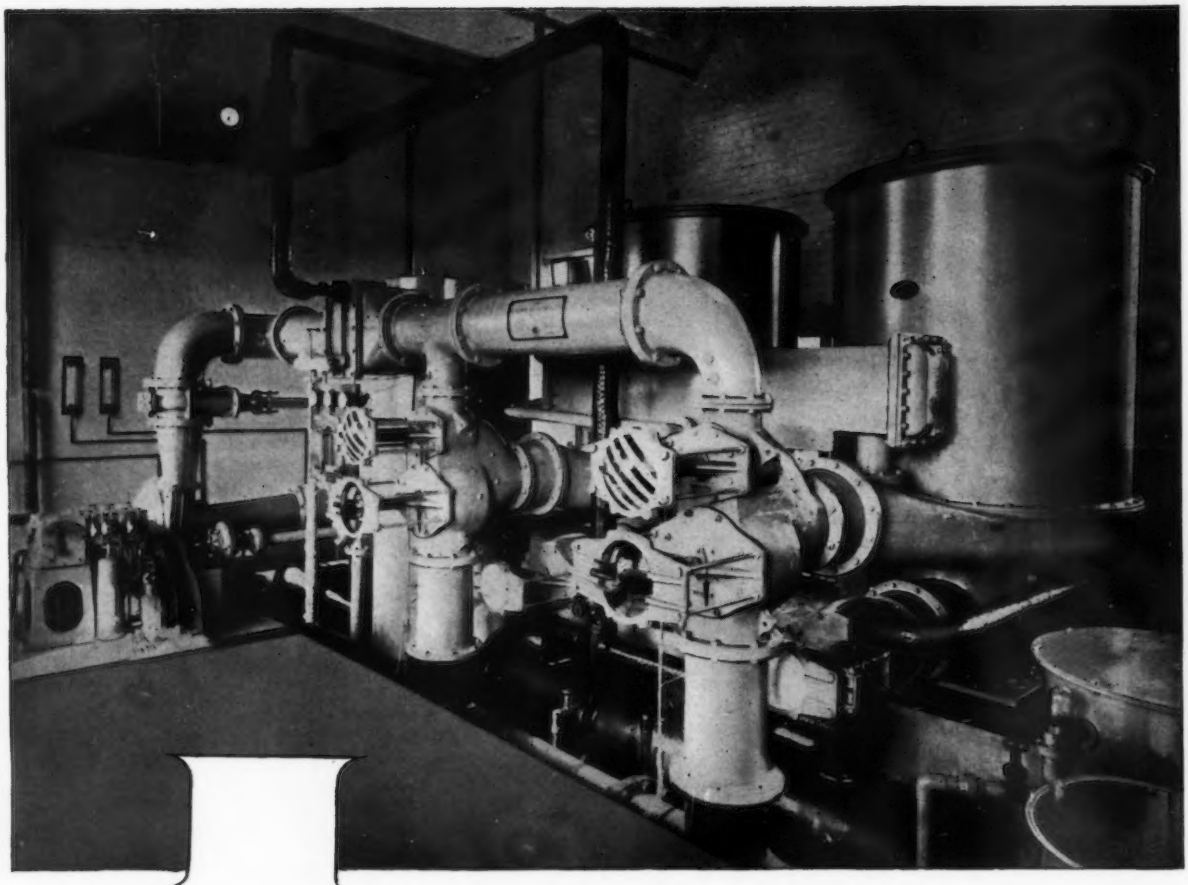

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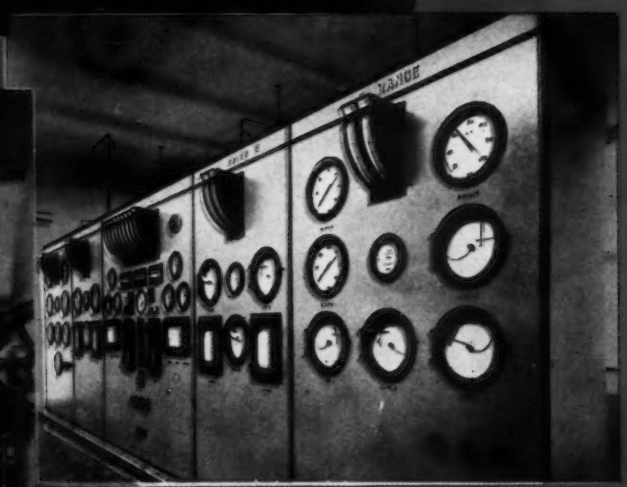

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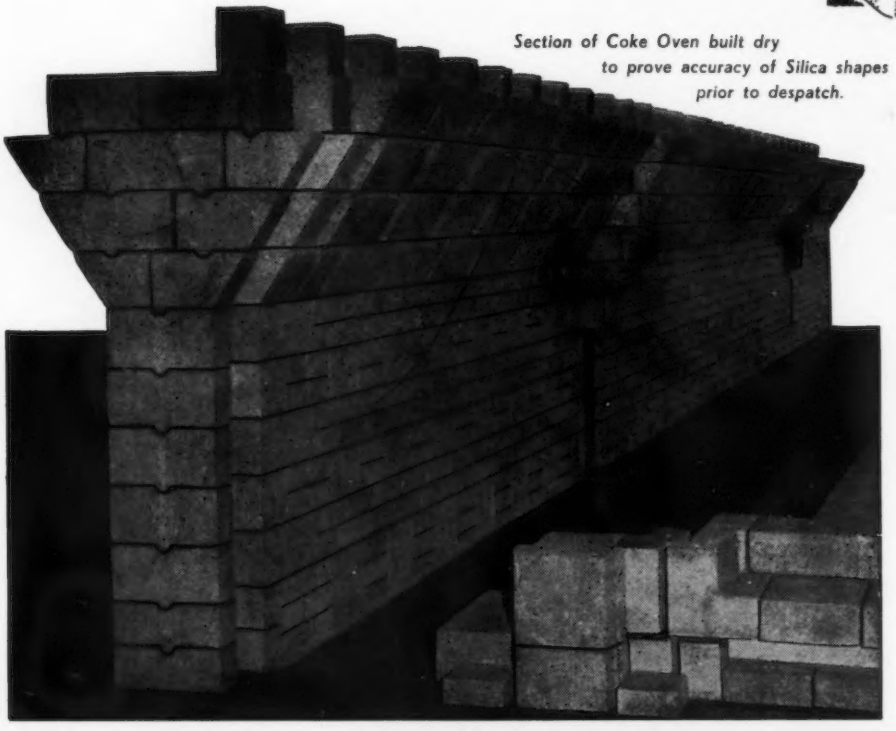

Section of Coke Oven built dry to prove accuracy of Silica shapes prior to despatch.

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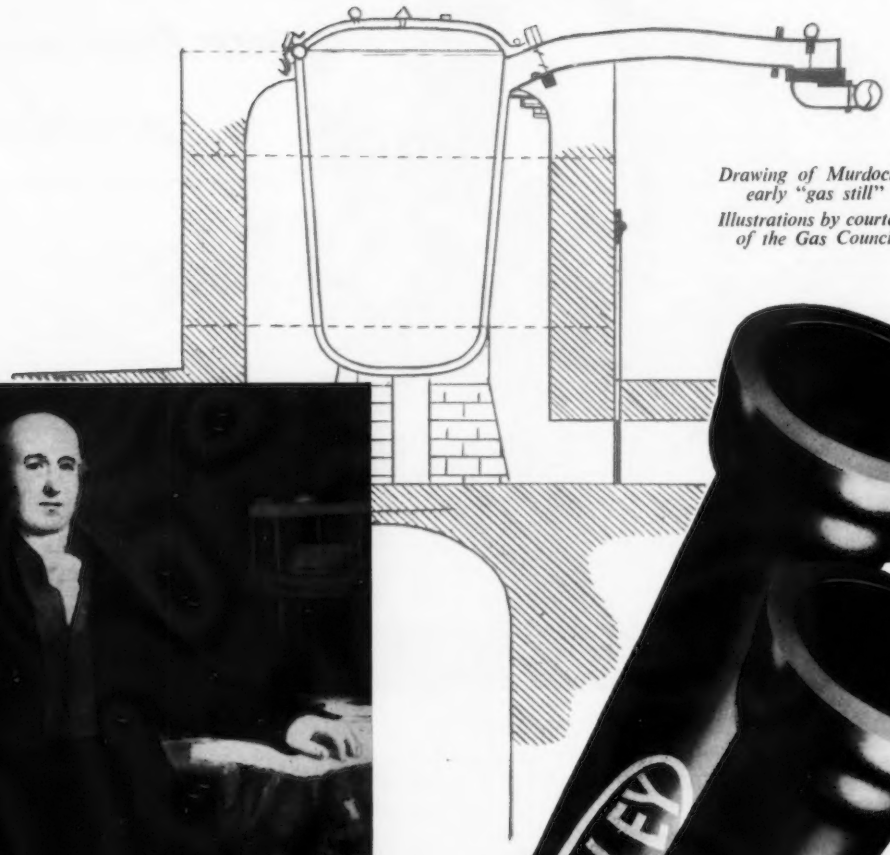

Drawing of Murdock's early "gas still"

Illustrations by courtesy of the Gas Council

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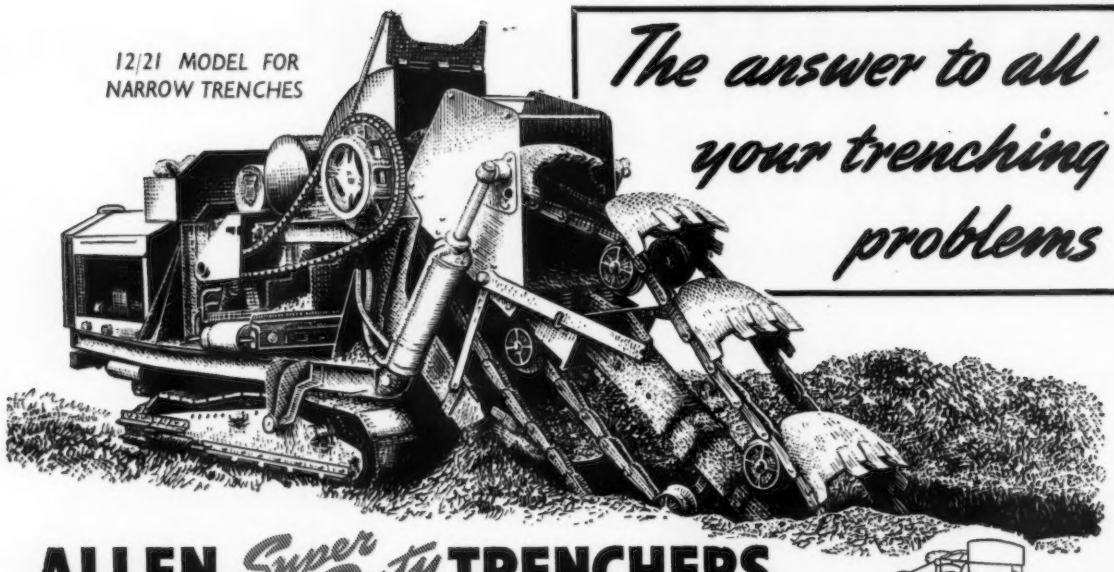

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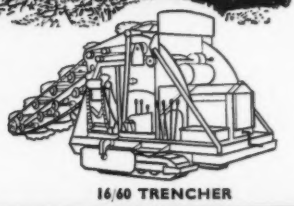

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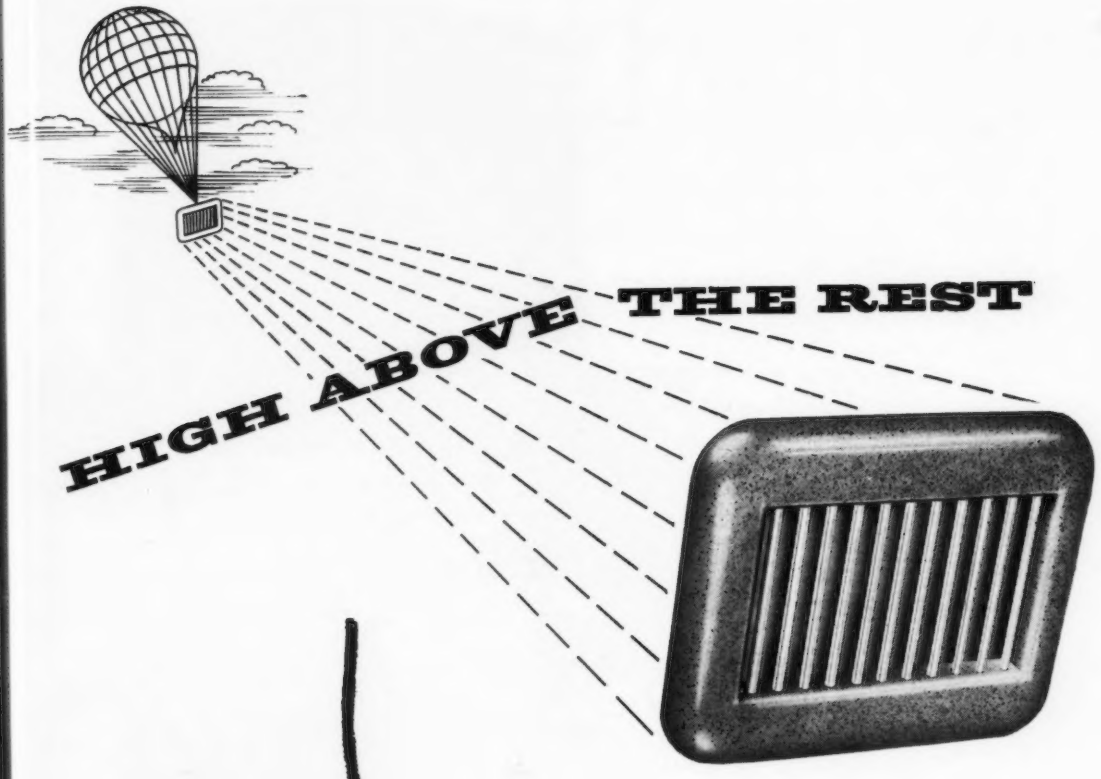

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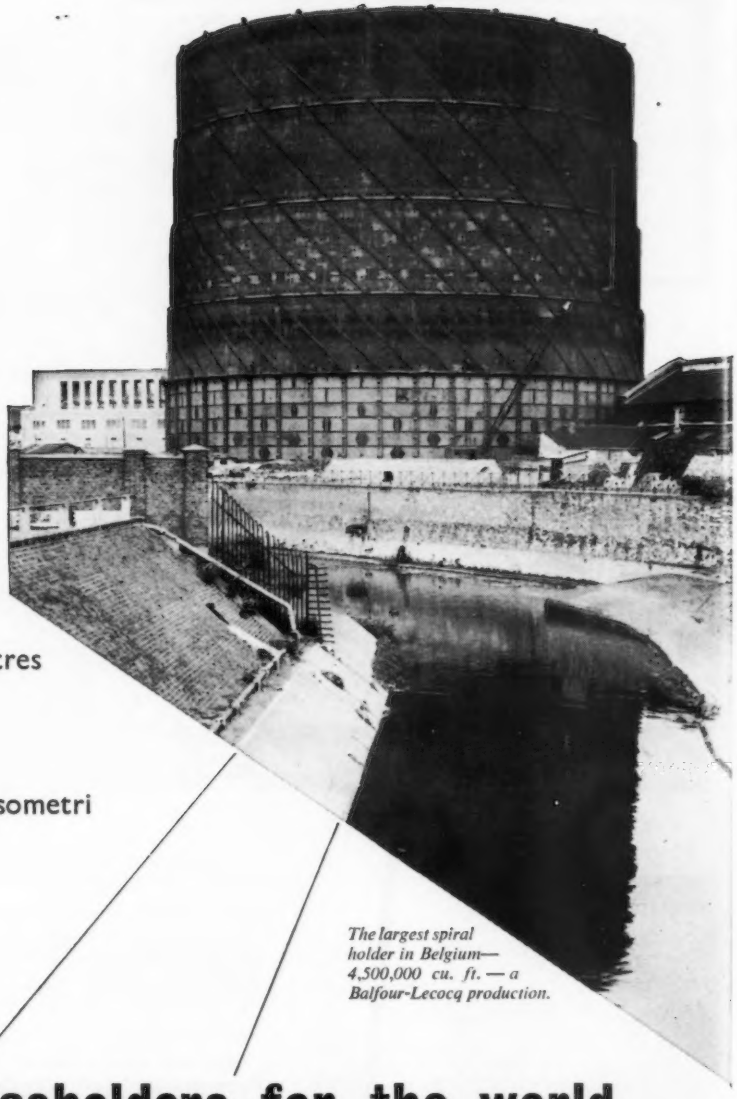

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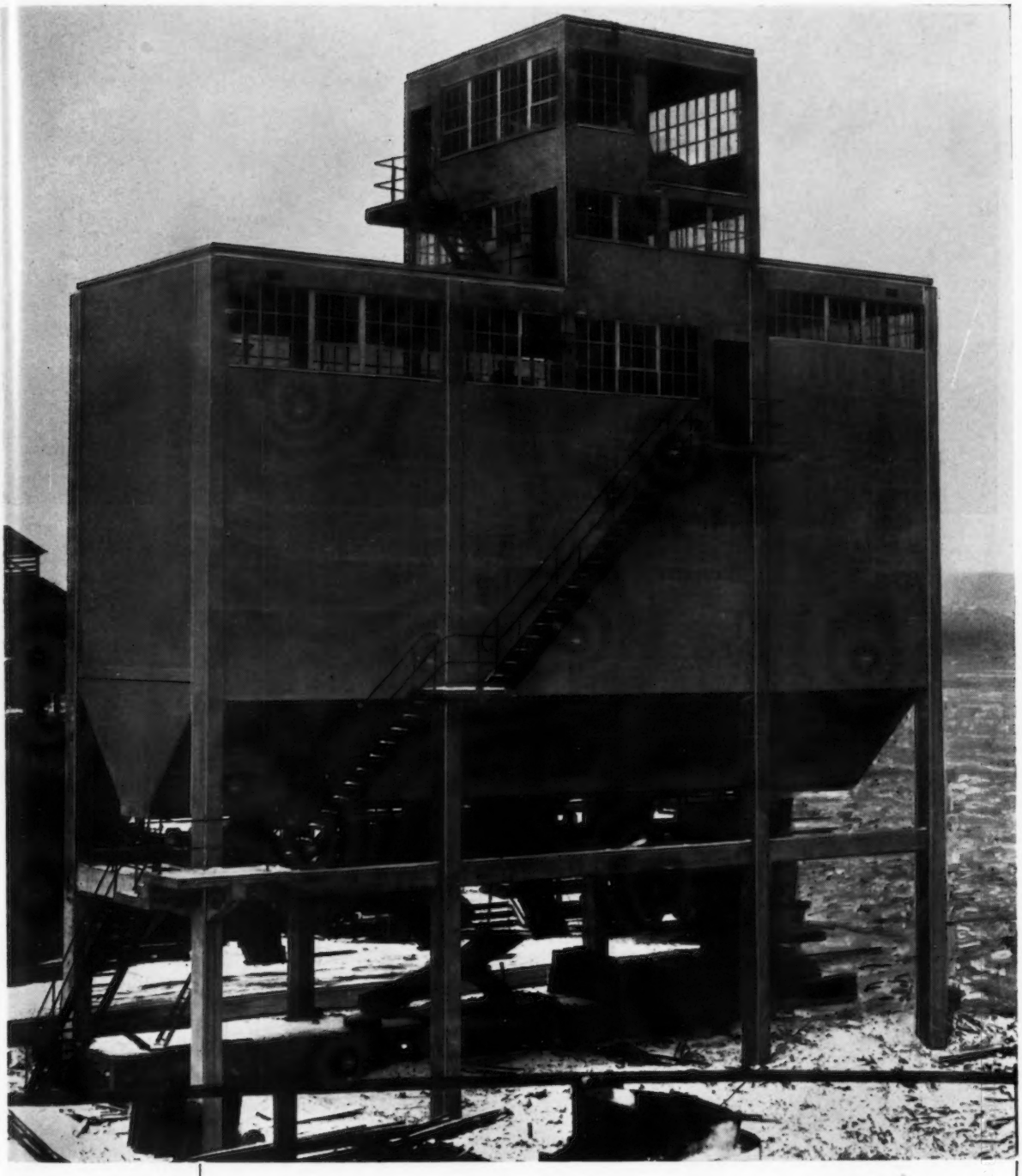

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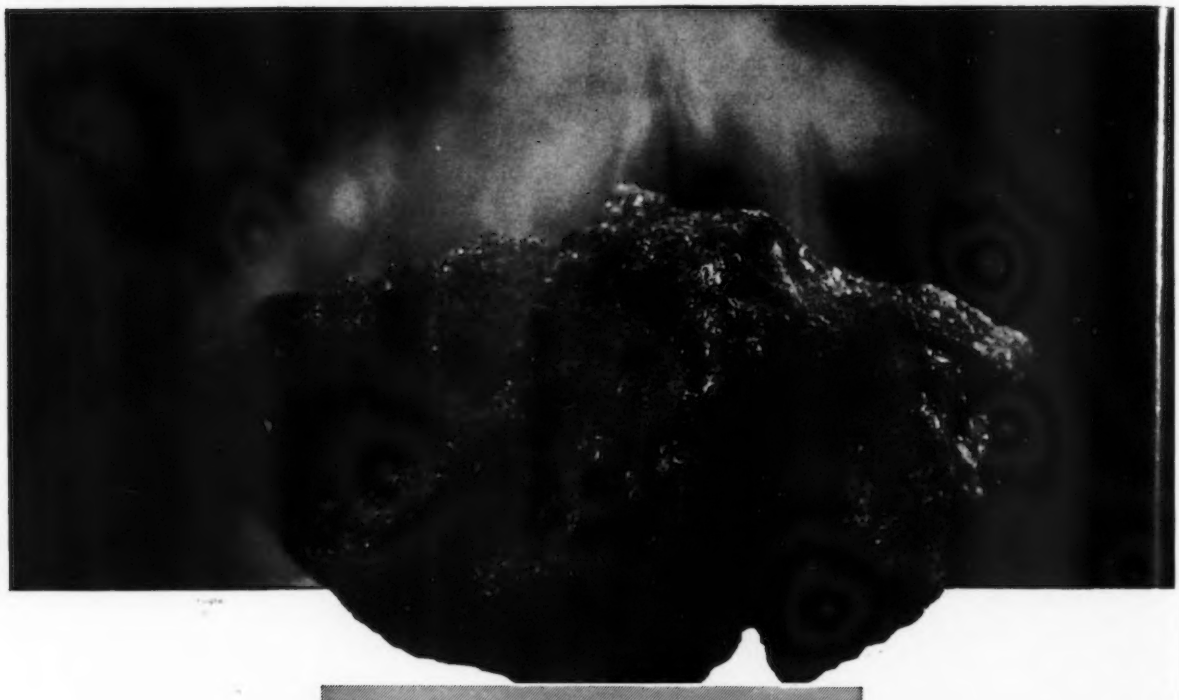

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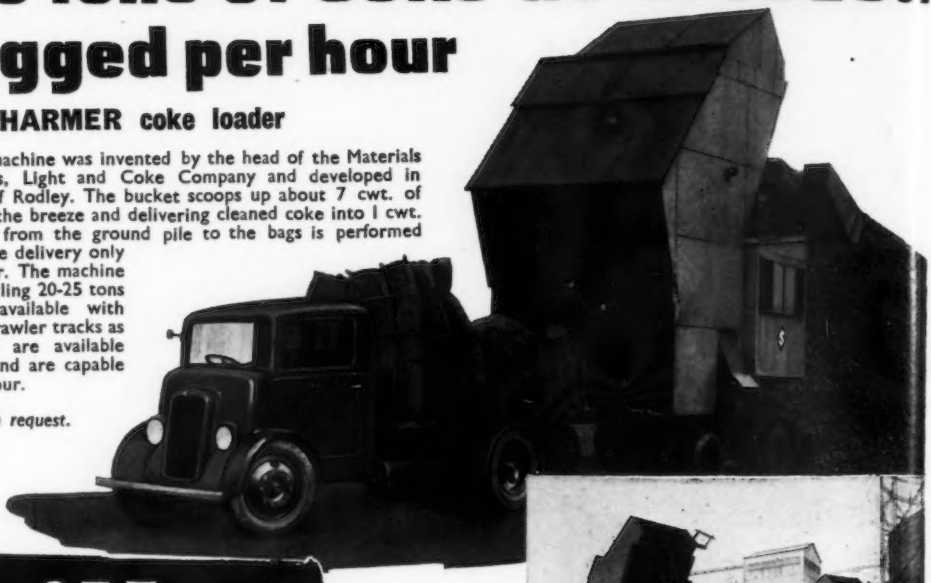

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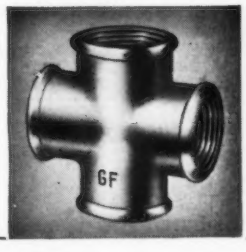

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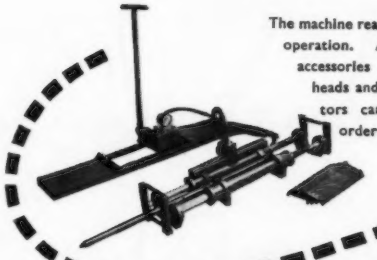

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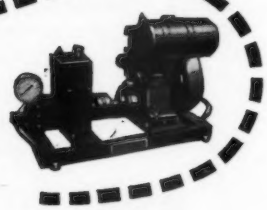

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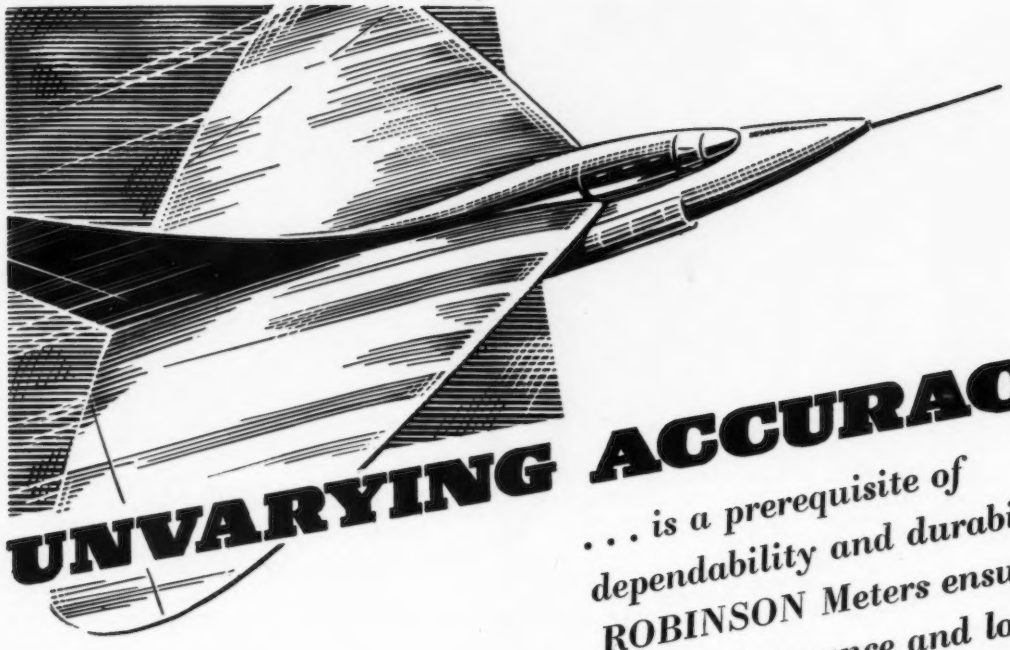

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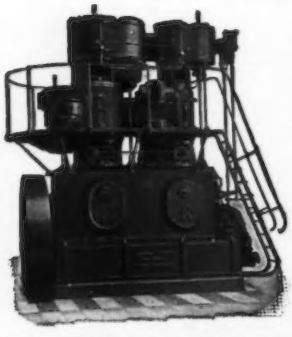

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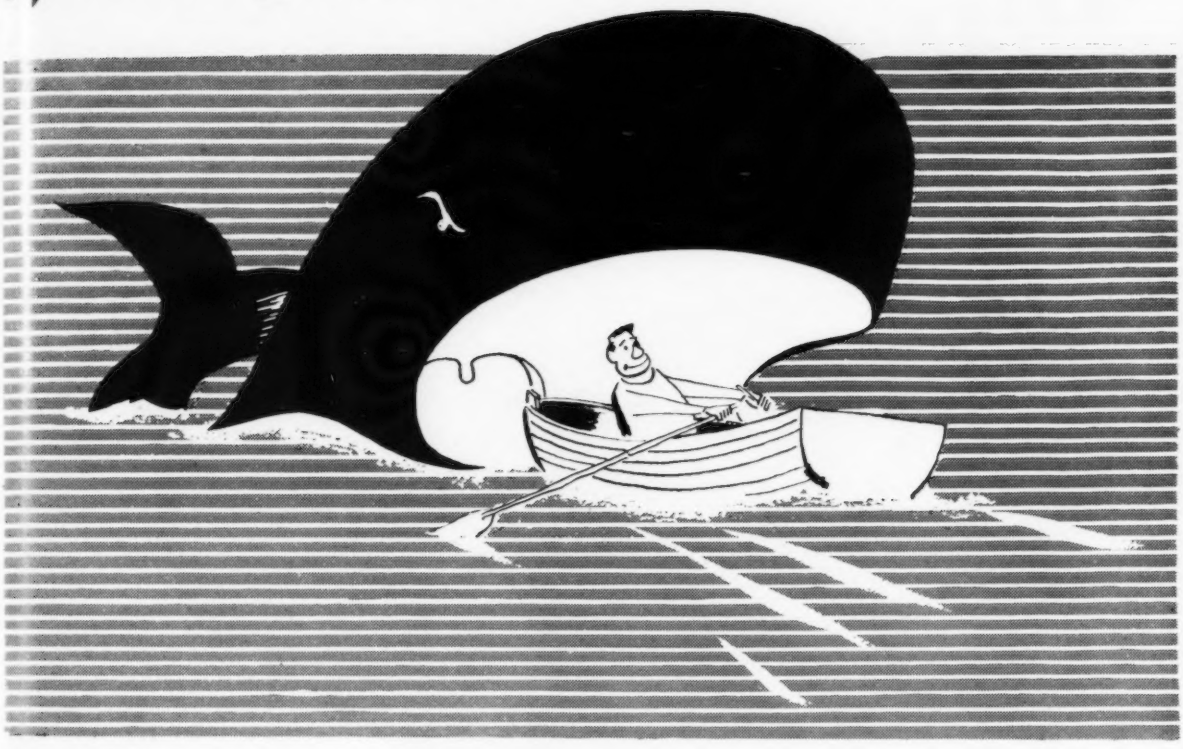

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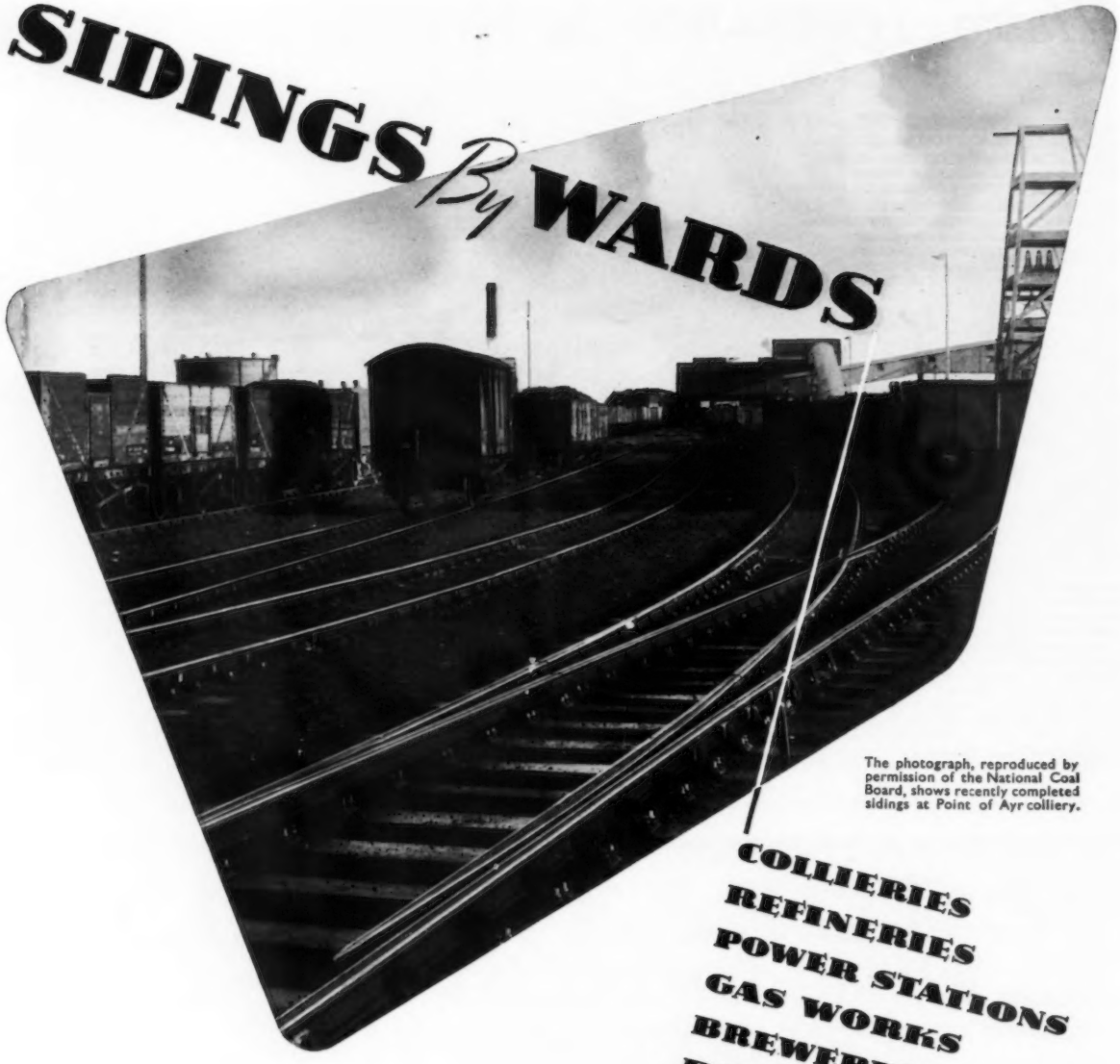

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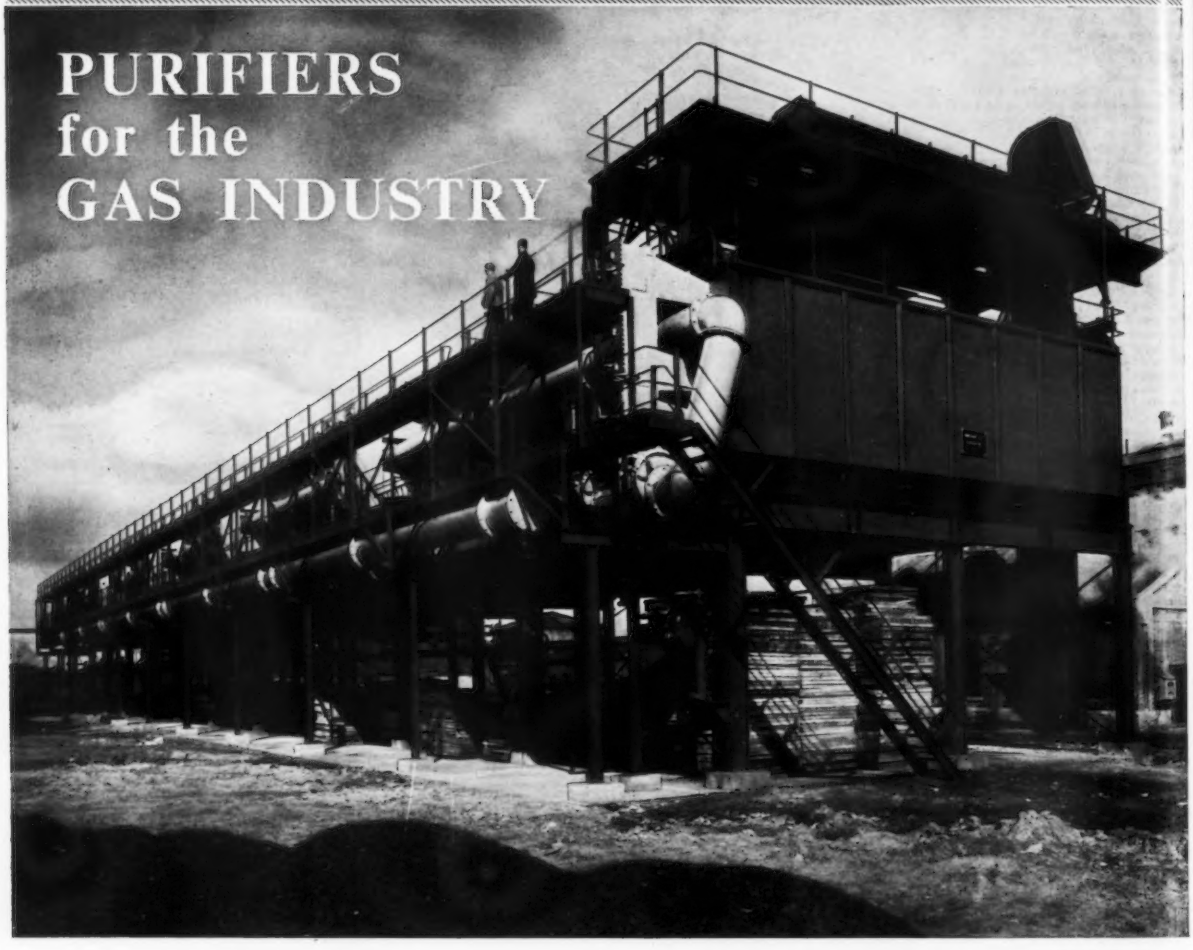

The illustration shows a recent installation at Warrington. It consists of five welded steel oxide purifier boxes, each 45 ft. 9 ins. by 35 ft. by 10 ft. deep, and was designed, fabricated and erected by Whessoe to the order of the North Western Gas Board.

The plant treats 6 million cubic feet of gas per day. Whessoe design and erect a wide range of gas plant and welcome enquiries.

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2

Gas Journal

VOL. 282 NO. 4794 APRIL 20, 1955

107TH YEAR

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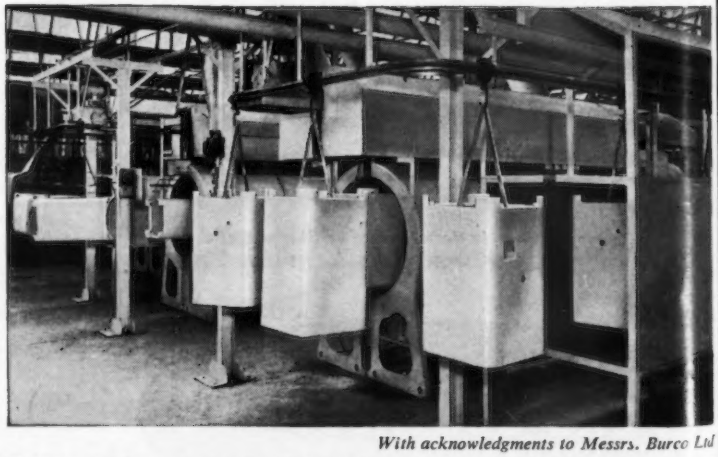

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(January-March, 1955)
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Gas Journal

VOLUME 282. No. 4794. APRIL 20, 1955. 107th YEAR

More Gas for the Potteries

THE rapid expansion of the use of town gas in the pottery industry centred in Stoke-on-Trent, has been remarked upon more than once. It goes on. Its present position and its recent growth is shown in the lengthy excerpts published in this issue from the very fine brochure issued by the West Midlands Gas Board to mark the inauguration today by Sir Harold Smith, Chairman of the Gas Council, of the latest addition to gasmaking plant at the Etruria gasworks. There must be few parallels to this rapid expansion in the annals of the gas industry. At the outbreak of war the output of gas by the Stoke-on-Trent Gas Department was roughly 3,000 mill. cu.ft. per annum. It is now over 8,500 mill. cu.ft. That this increase is due almost entirely to consumption in the pottery industry is shown by the fact that there are now 300 gas-fired tunnel ovens in operation with a total annual consumption last year of over 5,000 mill. cu.ft., representing 90% of all the gas sold for industrial purposes—and these industrial purposes include other processes in the manufacture of pottery, such as clay firing, frit firing, and bone calcination. Nor does it seem that the market is saturated, for it is estimated that the total output from the undertaking for the year to March 31, 1955, will reach 9,500 mill. cu.ft.—an increase of over 50% since nationalisation.

So far pace has been kept with this rapid march of demand by successive additions to carbonizing plant and the installation of carburetted water gas plant at Etruria (where manufacture had been concentrated in 1928) and some expansion of coke oven gas intake from the neighbouring Shelton Iron, Steel, and Coal Company's Works. In 1946 vertical retorts with a daily capacity of 6 mill. cu.ft. were brought into operation, extended in 1950 to a daily capacity of 8 mill. cu.ft. Two sets of water gas plant, each of 3 mill. cu.ft. daily capacity, were installed in 1948. The existing site was now fully developed and by the time nationalisation came along a completely new, but fortunately adjoining, site had been acquired and plans were ready for approval by the West Midlands Gas Boards for a complete new works of 8 mill. cu.ft. daily capacity, complete, that is, for manufacture, purification, and by-products recovery with the exception of storage which had already been catered for by the erection of a 5 mill. cu.ft. waterless gasholder put into commission in 1949. A glance at the plan of the recently completed works indicates that the new wagon repairs site, as it is called, is roughly square in shape. The area is 4.8 acres; but it will be seen that it is little more than a square whose side is the length of the new retort house. Yet in this square is accommodated a completely self-contained unit of 8 mill. cu.ft. daily capacity from retort house to wet and dry purification arranged on what we should say is as small a space per unit of capacity as has ever been achieved—and that with plenty of room for access to all parts. It is no secret that this design was arrived at by Mr. J. E. Stanier and his collaborators soon after the previous extensions. It was largely made possible by the adoption of the lower purifier, but it will be admitted that advantage has been taken of the adoption of every advance in modern design.

There are many features of interest in the design and arrangement of the plant. The disposal of the units in four practically equal parallel lines is perhaps the most striking. The layout of the railway sidings, in a square circuit of the whole site, is another, giving unusually good means of access to all parts. In detail, too, there is a good deal to be noted. The 96 Glover-West vertical retorts, for instance, are laid out in four separate benches in line, each of three settings. Following the valuable work of the British Refractories Research Association on the behaviour of refractories at Etruria, and in continuation of admirable field work which has been done by Dr. Rigby and his colleagues in recent years, advantage has been taken in this installation to compare under identical conditions four different standard materials by building each into one of these four benches, to keep them under observation, and to report to the industry in due course, and thereby, we should say, render the industry an incomparable service. The arrangement of the coal handling plant to take coal from either end of the retort house will be noted, together with the point that, as previously at Etruria, receiving hoppers are designed to take coal alternatively from road or rail vehicles. The coke storage bunkers of generous proportions with their grading and de-breezing equipment are an example of what the industry is doing to provide clean, accurately sized solid smokeless fuel to implement the clean air policy. The two different types of screening plant are another instance of provision in this plant for comparison of different methods at the full scale of practice. The design of steam and power

equipment is in accordance with modern ideas. The waste heat boilers, on which it is based, are designed to raise steam at 180 lb. per sq. in., just comfortably below the limit without economizers. Power is generated in two very fine 1,000 kW turbo-alternators of the back-pressure type. The aim is to balance the amount of steam discharged into the low pressure range (at 30 lb. per sq. in.) with that required for process work at the benzole plant and for steaming retorts. There is provision for alternative electricity supply from the grid.

Instrumentation of the whole plant is conceived generally on the principle of grouping instruments locally where observations can be made while adjustments are effected. At the same time, for several sections, they are grouped together for remote control where this appeared advantageous. An example of the latter is the sequence starting and stopping of coal and coke handling machinery. An important feature is the provision in the starter room of the 'visual mimic flow diagram' on which the operator can see what is happening to the material as he presses the push-button to set the selected sequence in motion—safe-guarded by no fewer than 70 safety emergency stop push-buttons disposed about the plant. An important feature of modern gasworks is provision for the comfort and convenience of operators. This is particularly necessary for the retort house staff and the generous proportions and equipment of the mess-room and baking facilities will be noted, as well as the arrangements for ventilation and dust removal in the retort house itself.

The centralization of gas-manufacture at Etruria by the Stoke-on-Trent Gas Department in 1928 must be regarded as a monument to the administrative ability and acumen of the late Mr. Alexander MacKay. Mr. Stanier, who succeeded him, completed the development of the site substantially on the same lines. But in the new installations on the wagon repairs site we see the expression of Mr. Stanier's own lifetime of experience in the chemistry and engineering of gas manufacture. The scheme was ready in his mind, and indeed set out on the drawing board, when the West Midlands Gas Board entered into possession. The Chairman and the Board are to be congratulated on their generous recognition of the merits of the scheme. The contractors, particularly the main contractors, West's Gas Improvement Co., Ltd., and W. C. Holmes and Co., Ltd., have evidently given of their best. Under the leadership of Mr. Stanier a result has been achieved distinguished in perfection of design, thoroughness, and finish in execution.

Gas Industry Rating

METHODS of rating gas boards constitute one of the three principal matters in the Rating and Valuation (Miscellaneous Provisions) Bill which had its second reading and was committed to a Standing Committee in the House of Commons on April 6. Mr. W. F. Deedes, Parliamentary Secretary to the Ministry of Housing and Local Government, in moving the second reading, told the House that, for the gas boards, arrangements contained in the Bill were agreed between the local authority associations and the gas boards towards the end of 1953. The nationalisation of the gas industry necessitated a revised method of assessing premises. In effect, the new system takes the total rateable value of properties occupied by the gas boards in May, 1949. It applies to it annually a formula calculated from the number of therms sold by each board and then apportions the adjusted rateable value of the boards among the rating areas concerned. That will be retrospective to April 1, 1952, and it will entail adjustments to the Exchequer Equalization Grants and the rates paid by gas boards for the period 1952-53 to 1955-56.

Mr. Duncan Sandys (Minister of Housing and Local Government) described the Bill as an effort to mop up all the odds and ends left over from the two previous Rating and Valuation Acts of 1948 and 1953. For instance, those measures did not deal with the changed situation arising from the nationalisation of the gas industry. The other nationalised industries, electricity and transport, had already been dealt with earlier.

Mr. G. S. Lindgren (Wellingborough) observed that all who were associated with local government would welcome the fact that there had been a settlement about the rating of gas undertakings after long-drawn-out negotiations and discussions, but he regarded the settlement as far from satisfactory. The Parliamentary Secretary had said it had been accepted by the local government associations, but he could speak for two important bodies, the County Councils' Association and the Urban District Councils' Association, and he was assured that the settlement was only made so that some progress could be made in negotiating, and so far as they were concerned they would continue to press for a quinquennial reconsideration of valuation. Mr. Lindgren objected to this because it was tied to 1949 values which, because of the lack of valuation, really meant 1934 values. Why, he asked, should the gas boards, even though they were nationalised, have their rateable value decided on 1949 values when domestic, business, shop, and industrial hereditaments had to face revaluation in the light of current values. Answering Mr. Lindgren, the Minister said there was an earlier proposal by the local authority associations for some quinquennial arrangement, but it was dropped later, and so far as he knew the present proposal was an agreed one.

CLOSING THE GAP

MR. DONALD HICKS, Director of Scientific Control, National Coal Board, addressed the North Western Fuel Luncheon Club, Manchester, on April 6, on the subject 'Britain's Energy Needs.' He recalled the warnings which had been uttered by Professor Jevons of Manchester University as long ago as 1865—was it a university then? Jevons foresaw, at a time when coal output was no more than 70 or 80 mill. tons a year, that rising costs, due to deeper mining, thinner and more faulted seams, might drive us to importing large quantities of coal from the United States and Germany. His warnings made little impression upon the industrialists, scientists, and economists of his day. Now his prophecies are fulfilled.

Mr. Hicks briefly surveyed the fuel consumption of the world and its several parts. He said we might take it that world consumption of energy was one ton per head of the population of 2,400 mill., that the United

States used seven tons per head, Great Britain 4.5, Western Europe two, and Asia 0.2. Productivity depended upon energy consumption; he thought the level of energy consumption in this country was practically proportional to our national income.

Now, Mr. Butler has said there is no reason why we should not double our standard of living in the next 25 years. What would that mean in energy consumption? If it is 225 mill. tons of coal now, it would have to be 45 in 1980. 'He might have been a little more cautious.' Sir Harold Hartley had been more conservative; he thought our national income might double in 40 years, requiring 340 mill. tons of coal (or equivalent fuels) in the 25 years. The National Coal Board had planned for 240 or 250 mill. tons by 1965. If we were to bring ourselves equal to the United States we should require at least 300 mill. tons of coal a year. There was at least a gap of 60 mill. tons of coal a year. Mr. Hicks then addressed himself to the possibilities of closing the gap. Water power, if fully developed, might account for the negligible amount of 4 or 5 mill. tons. If productivity continues to rise we must, in the immediate future, turn to oil. Since 1938 our consumption of oil had doubled and doubled again. This year it was some 6 mill. tons, equivalent to 9 mill. tons of coal. But the oil industry would be faced with considerable difficulty if it were called upon to make a serious effort to close the gap. In a word, the difficulties were summed up in the problems of the balanced marketing of a wide range of petroleum products—from petrol to heavy oil.

Atomic energy had been dealt with in the recent Government paper. Its proposals amount to the provision of electricity equivalent to 5 or 6 mill. tons of coal a year in 10 years' time. In other words it must be 10 years before atomic energy will contribute significantly to power requirements. It is possible that by 1975 its contribution might be equivalent to 40 or 50 mill. tons of coal per annum. It was clear, said Mr. Hicks, that the next 10 years will be critical. In this period coal will still be the basic fuel, supported by oil, with atomic energy just coming over the horizon.

Touching upon the domestic (among other) uses of fuel, he stressed the alarming fact that whereas we in Britain used the equivalent of 1½ tons of coal per head of population for this purpose, France got away with ½ ton and Germany with ½ ton or less. 'We are criminally spendthrift' in this matter. If we could do something about this it might go a long way to bridging the gap. These are a few points from a very interesting address. Mr. Hicks finished with a quotation from Adam Smith which may be condensed as follows—'the progressive State is cheerful, the stationary State is dull, the declining, melancholy.'

GAS COUNCIL ADVERTISING

THE Gas Council's latest series of Press advertisements shows a clear-cut breakaway from the varied gloom and glamour of recent months. Believing that all the world loves a baby—does it?—all four channels of consumer advertising have layouts featuring bonny bouncing Britons with contrastingly adult captions. Thus one pensive little angel states 'I am giving you my professional advice . . . you are working too hard,' and goes on to extol the labour-saving virtues of hot water by gas. Cooking, home laundry, and refrigeration layouts are in similar vein, but each of these last three has alternative layouts of a more general type. Also in the consumer advertising bracket is a very nice layout publicising the Mr. Therm's 'Bride of the Year' Competition. All these layouts carry the slogan 'GAS—to be sure.'

There is also evidence of a new approach to trade and technical advertising, and here the principal slogan is 'There is always another use for Gas.' There follow groups of three uses for gas in industry, and on the facing page or immediately above, according to the size of the insertion, is a cartoon with a similar theme. One of these 'other uses for gas' is illustrated by a housewife clad in her dressing gown terrifying a burglar with a flaming gas poker, and other cartoons showing other somewhat unorthodox uses will be used in the series. In our view this idea is a good one in that it makes a pleasant change from the entirely serious and often rather dull type of industrial advertisement, and it exploits the almost universal weakness for humorous cartoons. In our opinion by far the best of the current series is a colour advertisement which merely carries the same slogan 'There is always another use for Gas,' and is illustrated by a diminutive Mr. Therm with a monster flame at his finger tips. This is a real eye-catcher and deserves a long life.

We wonder if certain of those people in the industry who occasionally wax somewhat critical of Gas Council advertising appreciate the amount of thought and care which goes into the design and selection of these layouts. In our experience, the Gas Council is the only body which makes use of as many as four advertising agents in a collective rather than a competitive fashion. Representatives of these agents constitute a creative committee and pool their ideas on the assumption that four heads are better than one. In the field of national advertising, the Gas Council occupies a deservedly high place, and gas advertising generally is the envy of the electricity business. We have no doubt that the Gas Council will maintain this reputation and perhaps even enhance it.

TRIBUTE TO A GREAT MAN

YESTERDAY'S news of the death of Albert Einstein, mathematician and physicist, at the age of 76, came with the shock of personal loss to all those interested in the significance and progress of Science and its boundless implications for good or evil in our daily lives. Einstein, throughout his life, maintained the supreme importance of knowledge accompanied, and tempered by, wisdom. He saw, all too clearly, the dire implications of the present upsurge of technical knowledge and ability divorced from a complementary spiritual development, and warned humanity of the dangers of the path it was treading. Numbered among the greatest intellects of this, or any age, Einstein had no time for intellectual pride and was one of the most modest and approachable of men. His contributions to the realm of thought, in particular his theories of relativity, have established his name in history, and with his passing the world is a poorer place.

THE GENERAL ELECTION

The decision of the Government to call a General Election on May 26 has given rise to some conjecture in the gas industry concerning the arrangements for the Institution of Gas Engineers' Summer Meeting in Portsmouth from May 24 to 27. We understand that the arrangements for the meeting remain in force and that the Institution is circularizing all its members giving details of the procedure by which those attending the meeting may record their votes by post.

Lord Horder has accepted an invitation to be nominated as the new President of the National Smoke Abatement Society, to succeed Sir Ernest Smith, whose two-year term of office ends in September. The annual conference of the Society will be held this year at Bournemouth, on September 28-30. The Des Voeux Memorial lecturer will be Dr. Albert Parker, Director of the Fuel Research Station.

Personal Notes

SIR PERCY H. MILLS has joined the Board of Lancashire Dynamo Holdings, Ltd., and MR. J. G. SHAW has resigned from the Board. Mr. Shaw, however, remains a Director of some Companies within the Lancashire Dynamo Group.

MR. S. H. EDWARDS, Sales Manager to the Southampton and District Gas Undertaking, has been appointed Domestic and Commercial Sales Officer to the Board, and MR. F. W. FREETH, formerly Coke Adviser, has been appointed Coke Officer to the Board. Both appointments date from April 1.

MR. KENNETH HORNE has been appointed full-time Managing Director of British Industries Fair, Ltd. At present one of the six directors of B.I.F., Ltd. (the company formed last year to take over the Fair from the Board of Trade and to promote it as a commercial undertaking), Mr. Horne will give up his position as Sales Director of Triplex Safety Glass, Ltd., where he has worked for 27 years. He will take over his new post after this year's Fair which is being held at Olympia and Castle Bromwich from May 2 to 13.

MR. E. H. BROWNE, C.B.E., Director-General of Production to the National Coal Board, is to succeed Mr. I. W. CUMBERBATCH, C.B.E., as Chairman of the West Midlands Division on July 1. Mr. Browne's place at National Headquarters is to be taken by MR. H. A. LONGDEN, the present Production Director of the North Eastern Division. MR. J. I. WILLIS, the present Assistant to the Deputy Director-General (Sales) of the Headquarters Marketing Department, is to succeed as Deputy Director-General MR. R. H. E. THOMAS, who was recently made a Member of the National Board. MR. GEOFFREY KIRK has been appointed Chief Press Officer in succession to MR. NOEL GEE, who was recently appointed Director of Public Relations.

MR. JAMES NORVAL, Deputy Director of the General Branch of the Headquarters Marketing Department, will succeed REAR-ADMIRAL (S) H. R. M. WOODHOUSE, C.B., O.B.E., R.N. (Ret.), as Chairman of the South Eastern Division of the National Coal Board as from June 1. Mr. Norval entered the coal trade in 1928 when he became Secretary of the Central Collieries Commercial Association. The Association covered the counties of Yorkshire, Nottinghamshire, Derbyshire, Leicestershire and Lancashire. In 1930, his Association was incorporated into the Midland Amalgamated District Scheme. Mr. Norval was in charge of the Association's secretarial and sales work. In 1939, he went to Northumberland as independent Chairman of the Coal Sales Committee. When the industry was nationalised, he returned to Yorkshire as Deputy Marketing Director of the North Eastern Division of the National Coal Board. In December, 1954, he was appointed Deputy Director of the General Branch of the Marketing Department at National Headquarters.

MR. A. G. GASTON, of Bath, Senior Vice-President of the Western Junior Gas Association, is shortly taking up a new position at East Greenwich and will therefore be unable to succeed to the Presidency during the coming year. MR. D. J. MAUNDER, of Torquay, has accepted an invitation to step up from the post of Junior Vice-President to fill the vacant post.

MR. R. A. HOWSON, Deputy Divisional Marketing Director of the West Midlands Division of the National Coal Board, is to succeed MR. V. J. WILKES, O.B.E., as Marketing Director of the same Division; and MR. H. DUDLEY, Head of the Industrial Relations Branch of the labour relations department at national headquarters, is being seconded to the South Eastern Division to succeed MR. G. W. TWIGGER as Labour Director.

MR. FRANK BANFIELD, General Manager of the Expanded Metal Co., Ltd., for the past year, has been appointed Managing Director. He succeeds Lieut.-Commander G. C. HANS HAMILTON, who retains his position as Chairman of the Company. Mr. Banfield joined the Company in 1924 as an office boy at Westminster. Before being appointed General Manager, he was successively chief clerk and in charge of the development of aluminium sales.

MR. J. RUTTER has been appointed a Technical Representative of the Jenolizing Co., Ltd., manufacturers of phosphating processes, and is undergoing intensive training in the Company's Rathbone Street laboratories. Previously he was preparing and controlling painting specifications for the Commonwealth Government in Sydney, Australia, and he brings to his new appointment a wide knowledge of paint technology, based on 20 years' experience in the paint industry.

MR. JOHN C. HAMILTON, who has succeeded MR. J. E. N. DAVIS as Chief Organization Officer of the National and Local Government Officers' Association joined the staff as a district officer in 1946. In the next four years, he served as district organization officer in the South Wales and Yorkshire districts before transferring to headquarters as local government service conditions officer in 1950. In that capacity, and as assistant staff side secretary to the local government National Joint Council, he has played a major part in national negotiations on salaries and service conditions, and prepared and presented cases for the Industrial Disputes Tribunal. Previously, Mr. Hamilton served for 18 years—interrupted only by six years' war service—in the Treasurer's Department of Preston County Borough Council.

Whitehaven (Cumberland) Corporation is being asked by the local Consumers' Committee of the Northern Gas Board to reconsider its proposal to supply only electricity to the new Homewood housing estate.

Obituary

MR. JOHN HUBERT WRIGHT, who retired as Superintendent of the Luton Gas Company in 1940, has died at his home in Luton aged 83. From 1899 he spent four years with the firm that is now Ashmore Benson Pease & Co., studying plant design and erection. In 1893 he joined the Gas Department of the Salford Corporation. From 1894 to 1901 he was Assistant Works Manager at the Hendon gasworks, Sunderland, and from 1901 to 1903 Superintendent of the Effingham Street Works, Sheffield Gas Company. In 1903 he became Superintendent of the Grimethorpe Gas and Chemical Works of the Sheffield Gas Company, relinquishing this position in 1912 when he became Assistant Manager of the Vancouver Gas Company, British Columbia, Canada, which position he held until 1916. In 1919 he became Superintendent of the Luton Gas Company, which position he held until his retirement. He was keenly interested in golf. He leaves one son, who is Engineer in the Bishop's Stortford District of the Eastern Gas Board.

Diary

April 21-22.—SCOTTISH ASSOCIATION OF GAS MANAGERS: Spring Meeting, Peebles.

April 21-23.—NORTH WESTERN GAS BOARD: Staff Conference, Morecambe.

April 22.—MIDLAND SECTION, I.G.E.: Annual General Meeting. Queen's Hotel, Birmingham, 2.30 p.m.

April 26.—INSTITUTION OF CHEMICAL ENGINEERS: 33rd Annual Corporate Meeting, May Fair Hotel, London, 11 a.m.; Annual Dinner, 7.30 p.m.; principal guest, the Duke of Edinburgh.

April 26.—MIDLAND JUNIORS: Annual General Meeting. 'Works Locomotive Tyres,' G. E. Palmer. Birmingham.

April 27.—MANCHESTER JUNIORS: Annual Dinner, Lonyford Hall, Stretford.

April 27.—NATIONAL BENZOLE AND ALLIED PRODUCTS ASSOCIATION: Annual General Meeting. Grosvenor Hotel, Victoria, London, S.W.1, 2 p.m.

April 28.—NORTH THAMES G.C.C.: Caxton Hall, Westminster, 2.30 p.m.

April 28-29.—WALES AND MONMOUTHSHIRE SECTION, I.G.E.: Spring Meeting, Tenby.

April 28-30.—EAST MIDLANDS GAS BOARD: Staff Conference, Skegness.

April 29.—LONDON JUNIORS: 'Subjective Response and Environment,' F. C. Smith. 178, Edgware Road, London, W.2. 6.30 p.m.

April 29.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Fifth Annual General Meeting, Grand Hotel, Aytoun Street, Manchester, 2.30 p.m., preceded by luncheon, 12.30 for 1 p.m.

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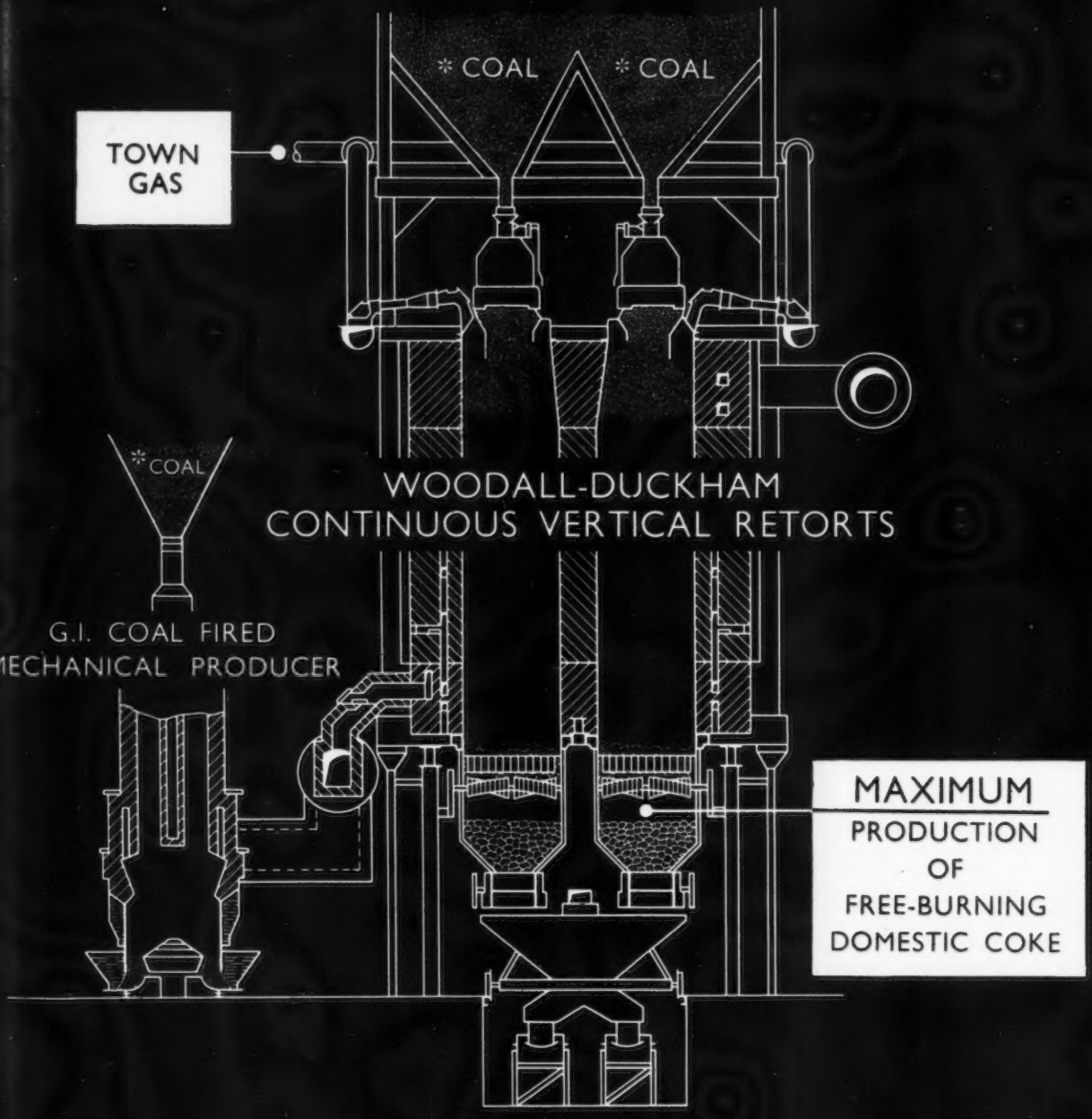

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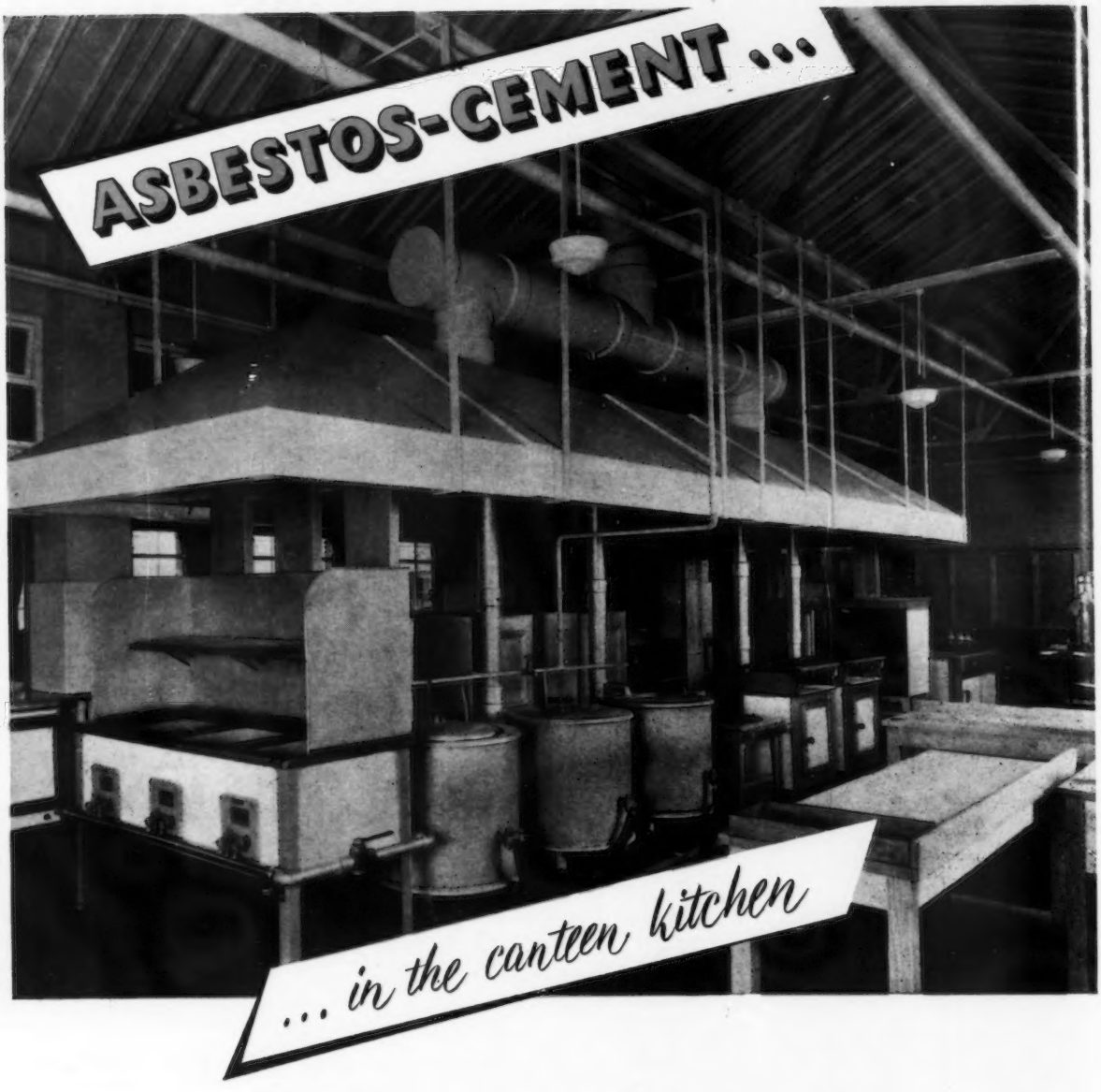

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Distortion of Carbonizing Plant by Heat

A report of the discussion on the paper by G. Dougill, M.Sc., F.R.I.C., North Thames Gas Board, Beckton Works, presented to the London and Southern Section of the Institution of Gas Engineers on March 15. The paper was published in the 'JOURNAL' on April 6, (pp. 43-48)

Dr. J. Burns, G.M., North Thames Gas Board, opening the discussion, said Mr. Dougill's subject was one they did not often discuss and the Section and the industry as a whole should be very grateful to the author for the sound and hard work that had been put in. There was very little romanticism in this section of gas engineering but the whole subject of refractories and of refractory structures was fundamental to the success of coal carbonization. If one looked back over the years, one was bound to recognize too, that this was a subject in which they had not advanced as far as they should have done. Having had the occasion to look at the probable life of a carbonizing plant, he could see very little difference during the last, say, ten to fifteen years; very little difference in point of time with the life of the carbonizing plant, although there was undoubtedly an improvement in the life of the carbonizing plant when related to the throughput of coal, and it was so very important indeed that they should advance along the lines of progress in carbonizing structures and in refractory materials.

Improving the Load Factor

Dr. Burns said he had just left a meeting of the Fuel Luncheon Club where Mr. Gerald Nabarro, M.P., had given a rousing address on smog. Clearly, the Beaver Report gave a terrific urge to the carbonizing industry to progress, to install more carbonizing plant and to provide more smokeless fuel for the people. It might be a small part of that very big object, but it was a very important part. At the present time, the load factor within carbonizing plants was in the region of some 83%. They could do better than that. If by work which Mr. Dougill was doing, and if by improvement in the refractory materials they could improve that 83% load factor, it would have a material effect on the costs of gas production and in their ability, on the existing plants, to meet the very much higher load that was likely to be put upon the industry. The gas industry was always seeking improvements in refractories and they tended to move from one refractory material to another rather quickly. Fortunately, thought Dr. Burns, the movement was always in the upward direction and they had, in fact, made some improvements in the refractory materials. He did not think, however, that the materials were such as they could accept without testing and the more closely they tested them, the more likely they were to get the manufacturers to keep to the specification.

Mr. J. T. Veryard, South Eastern Gas Board, congratulated Mr. Dougill on his clear exposition of the problem of dealing with the expansion that occurred when a carbonizing plant was brought up to operating temperature. He would heartily support Mr. Dougill's plea that contractors should be informed of the behaviour of carbonizing plant after its construction and during its life, and felt that the contractors and the gas industry's designers could learn much if a critical examination were made of the plant as it was being demolished for rebuilding. Mr. Veryard said he had often observed that, in a number of problems of common interest, the conclusions arrived at and the procedure adopted by the North Thames Gas Board and South Eastern Gas Board were very similar, although the approach to the problem might have been quite different. The expansion allowances and their disposition as given by Mr. Dougill were in general similar to those adopted by the South Eastern Gas Board, but they did not appear to get quite as much movement of brickwork, and distortion of bracing as experienced by the North Thames Gas Board. This might be due to allowing rather higher figures for expansion than those given in Fig. 1.

A point of interest in the paper was that the bracing was designed for a loading of 1 ton per retort as being safe for the retort material and reasonable for the buckstays. In his own Board, by determining the actual maximum deflection of the side buckstays of a number of settings, the total load per buckstay was calculated and the loading per retort worked out to be 1.5 tons. In this connection he noted that the North Thames Gas Board did not follow the policy of slacking off the bracing to keep the expansion joints open to allow for after expansion as advocated in a paper given at the 1953 annual general meeting. There could be no doubt, said Mr. Veryard, that the correct procedure was to tie in the setting rigidly from the beginning of the heating up period, so that as expansion took place the expansion joints closed up first. About 80-90% of the total expansion occurred by the time 600°C. was reached and if the expansion joints were correctly designed and placed, it was not until this temperature was reached that adjustment of the buckstays became necessary. The practice of the South Eastern Gas Board was to allow for 80% of the anticipated expansion by provision of expansion joints, the additional movement being taken up by adjustment of the buckstays. This seemed to work out fairly well in practice and it might be of interest to quote as an example some figures given by Mr. Stott in the discussion on an earlier paper on the subject:—

The total length of a bench of 16 settings was 1,824 in. (162 ft.); theoretical longitudinal expansion at 1.3% = 24 in.; allowance for expansion joints at 80% of theoretical = 20 in. (1¼ in. per setting). On heating up, no adjustment was made to end buckstays until the temperature of chamber brickwork reached 600°C.; the final buckstay movement recorded four weeks after gasmaking was 1¼-1¾ in. and no further adjustment was necessary.

As far as he was aware, they had not experienced the further increase in expansion after 19 months' operation noted by Mr. Dougill. It might be that was after this period conversion of the quartz was not complete and expansion was still occurring. If this was correct it emphasized once again the necessity for the conversion of the quartz to be carried out effectively in the manufacturers' furnaces and not in gas industries' carbonizing plant.

Refractory Materials

In the section dealing with the quality of the refractory materials, Mr. Veryard said he was not quite in agreement with some of the views expressed. He considered that, apart from a specification for the material and an agreement between the buyer and seller as to the method of sampling and testing, the buyer should be allowed to inspect the material at the manufacturing end, and agreed check tests should be carried out on the material as delivered.

With regard to tolerances in dimensions, he considered the balance between precision and price was in favour of precision when all related costs were considered, and it was regretted that the dimensional tolerances given in the recent specification were as wide as ± 2%. It was true that recently they were unable to obtain in this country material to their own requirements of ± 1½% but they were able to obtain a large quantity of German material which was within a tolerance of 1½% and since then, some English manufacturers were supplying material to this tolerance. One last point of difference was that they felt the sorting out and blending of materials into size limits was most undesirable, particularly if this was applied to coke oven material where maximum joint thicknesses were less than 4 mm., *i.e.*, less than ⅛ in.

Dr. S. Pexton, North Thames Gas Board, declared that the paper contributed a most valuable contribution to the technical literature on a series of complex structural problems relating to most forms of carbonizing plants, but in particular to the large installations of horizontal retorts and coke ovens at Beckton. Dr. Pexton was particularly pleased that Mr. Dougill

made reference to a paper on similar problems by Mr. L. Muir Wilson in 1945, which was published with discussion in the 'GAS JOURNAL' (Vol. 246, pp. 602, 634, 675, and 680). At that meeting, he had given an example of the structural weakness of the steel girder floors of a continuous vertical retort installation, when overheated through restricted air circulation. He had also referred to the overheating of the tie-bars of intermittent vertical retorts. Dr. Pexton said his object in joining in the present discussion was to introduce, with the help of two lantern slides, (1) a possible local difficulty arising from removing underground flues out of proximity to foundations and undersurface water, and (2) to introduce a method of providing continuity of cooling water circulation in the tie-rods of benches of intermittent vertical retorts or chambers, where it might be deemed important to have water cooling for the tie-rods so as to preserve the rigidity of the bracing and to ensure the long life with perfect shape for appropriately narrow retorts or chambers.

Cross-wall Leakage

The first slide illustrated the flow of the waste-gases through the recuperator of an installation of intermittent vertical retorts where the waste-gas passed via an overhead brick-flue encased in steel to the waste-heat boilers and chimney. The reversal of flow of the waste gases at doubled velocity through the base of the recuperator resulted in extra resistance to flow, especially when dust might have accumulated at the base. In consequence, the tendency for cross-wall leakage of secondary air into the waste-gases might increase towards the end of the life of the installation. Dr. Pexton said he had pointed this out in the unpublished discussion of a paper by D. C. Bertram in 1952 ('GAS JOURNAL.' Vol. 271, p. 148). For example, with recuperators 10 years old, the increased quantity of gases to be handled by the waste-heat boiler fans exceeded the normal overload. The waste-gases were short circulated via an auxiliary waste-gas damper to the overhead main flue while the waste-gas channels of the lower part of the recuperator were filled with dry refractory cement powder. The carbon dioxide content of the waste-gases at the boilers was increased from 13.4% to 17.2% with some sacrifice in degree of preheating the secondary air. In the subsequent re-setting programme it was possible to revert to the full use of the recuperators, but facilities were provided for powder filling the lower part of the waste-gas channels in the recuperator, should cross-wall leakage of secondary air ever again become serious.

The second slide showed diagrammatically the method of providing a closed re-circulation of water for cooling the tie-rods. The water-flow through the individual tie-rods was controlled by a plug cock according to a pre-selected outlet temperature. The water then flowed to an underground receiving tank from which it was pumped through an atmospheric rack cooler up to an overhead feed tank from which the water supply gravitated to the manifold inlets of the tie-rods. A ball-valve control to a clean water supply maintained a make-up to the system, in the rare eventuality of loss of water from the system. Originally, open tun-dishes were provided to give an individual sight-overflow to each tie-rod, but these tun-dishes were soon replaced by closed connections, each incorporating a control thermometer. This improvement was made to keep the water system free from any retort house dust. The system had continued to operate satisfactorily for the past six years, concluded Dr. Pexton.

Later in the discussion, Dr. Pexton emphasized that the water cooling of tie-bars should not necessarily supersede any satisfactory system of air-cooling such, for example, as that described by Mr. Dougill.

Stability of Settings

Dr. A. E. Haffner, North Thames Gas Board, who was unavoidably absent, had his contribution read by the Secretary. Dr. Haffner asserted that the increasing number of published investigations of the stability of settings was adding greatly to their knowledge. The temperature and dimensional surveys carried out by Laming and his co-workers, the report by Southworth on the expansion of a horizontal chamber setting, were good examples. Now, Mr. Dougill had added another, and one that was full of his native shrewdness. The life of retort settings was continually being improved but the length of life was such that mistakes were with them for an embarrassingly long time and caused designers and clients to be unwilling to adopt more than minor deviations from designs which had been acceptable hitherto. Papers like that helped to break away from the over-cautious and empirical approach. The choice of materials for different parts of settings was determined by a combination of suitability of refractoriness and price. There was no point in having expensive materials in locations where a cheaper material would have a life equal to other parts of the settings. This diversity of material brought about different expansion characteristics and incompatability was increased by the irregularity of the expansion curves. The actual effect was rather greater than that shown in Fig. 2 of the paper. At the actual boundary between two dissimilar bricks, the differential expansion was true because those two courses must be at the same temperature, but at a very few courses away there might be hundreds of degrees difference in temperature in the two types of material.

Between materials of different expansion characteristics, it might be decided to use sliding joints incorporating graphite in the jointing material. Did the author consider there was no virtue in that graphite? If a setting was shut down cold it was still necessary for that joint to function as a sliding joint on the second heating up but, in the meantime, all the graphite had been burnt out during the first working period.

The tightness of a sliding joint under difficult circumstances was recently demonstrated when a sillimanite band was introduced into a vertical retort and a sliding joint was made between sillimanite and silica at a zone where the temperature was at least 1,350°C. In his design for supporting the retorts, Mr. Dougill had allowed the bulb rails and buckstays to be bowed by the expanding retorts. How much of this bow was removed on cooling down? If none of it, then the bracing had failed to retain the calculated pressure on the retorts. It was noted that in the front elevation in Fig. 5 of the paper, no expansion allowances had been made at two levels in the structure. Was that logical? Had the omission led to any distortion?

Dr. Haffner referred to two cases of distortion in vertical retorts. First, where the back wall of the producer was continued, as the front wall of the setting, the expansion of the firebrick wall lifted the brickwork and retorts on the producer side by at least ¼ in. off the floor grillage and caused retort joints to be cracked. Secondly, the absence of any allowance for expansion in bottom firebrick caused the 16 settings to be extended in length by 16 in. and distorted the end stanchions by 8 in. The effect was reduced by splitting the 16 settings into two benches. The stanchions were replaced in an interesting manner during a retort reset (and not a rebuild when the load was lighter) by using 200 ton jacks. It would have been much more profitable, said Dr. Haffner, to have left an expansion space originally. In calculating expansion spaces, did Mr. Dougill allow for joint compression? Jointing material was inevitably more porous than brickwork and made it more vulnerable to attack. Was not joint compression a desirable project?

Temperature Difficulties

Mr. H. W. Moys, North Thames Gas Board, said that all engineers would be in agreement with the author on the necessity of raising the temperatures in a horizontal setting carefully, but the author could have emphasized the care that should be taken to ensure that the temperatures on the fire side and blank side of the setting are kept the same. This was a difficult thing to do as the radiation from the volume of coke in the producer was considerable.

The method of allowing the longitudinal expansion of the retort to be accommodated was important as at all times the retort mouthpiece must be properly supported. Just before the last war, they had experimented at Bromley Works, with the use of tapered wedges in the brackets holding the retort mouthpiece bracing rails which could be withdrawn as the retorts expanded. This was not a successful experiment as movement of the mouthpiece caused a disturbance in the joint between the short siliceous end of the retort and the first silica segments. More recently, Mr. Moys said, he was associated with the resetting of a horizontal retort house where they had used springs between the mouthpiece bracing rails and the bracket attachment similar to those described by the author. This attempt to accommodate the longitudinal ex-

pansion was only a partial success as again there was some slight leakage at the joints between the short clay ends and the first silica segments. He wondered what Mr. Dougill's experience had been with this system.

Mr. Moys said that in the past most of them had attempted horizontal settings to maintain level retorts when using the centre section of the retort cross walls built with silica bricks and the outside section adjacent to the pier walk of firebrick. There had been many illustrations of badly tilted retorts when using this construction. He had been very interested recently to see a bench of retorts demolished at Poplar Works after a life of some 3,000 days where this method of construction had been used and yet the retorts had remained level.

The expansion allowances in the silica section of the cross walls had been carefully designed by the staff of the late Commercial Company who used thin strips of easily charred wood to fill the expansion spaces in the cross walls and round one side of the retorts.

Mr. Moys said he would also like to know the author's experience with the outward movement of the retort on the blank and producer side of the setting. From his observation on a number of horizontal retort houses there was a greater movement on the blank side of the setting. This he thought was due to the added support to the buckstays by the producer and producer bracing on the producer side and to the method of supporting the coal hoppers on the blank side buckstays practised in most horizontal retort houses.

Coke Oven Floors

Dr. G. E. Foxwell, Past President of the Institute of Fuel, said the author had stated that silica was now used right down to coke oven foundation level. He wondered whether Mr. Dougill had more recent knowledge on this subject because there had been, at least until recently, two schools of thought: (1) Maintaining that silica should be used right to the bottom of the structure; (2) that silica should be terminated from three courses below the oven sole level and semi-silica used for the regenerator walls. The difference between the two forms of construction was partly that the completely silica battery tended to last longer, whereas if the two-material construction had to be rebuilt more frequently, it was generally necessary only to rebuild the silica portion, at least at the first rebuilding.

Mr. Dougill's Reply

Mr. Dougill, replying, said Dr. Burns' appreciation of the work covered by this paper was only a further but very valuable confirmation of the support this work had received from him for many years. His statement that they must not only improve the quality and gas-tightness of their carbonizing plants but that they also needed improved design to lengthen their life was, of course, very important owing to the very high capital costs of present-day plant. Dr. Burns had also drawn attention to the fact that the Beaver Report emphasized the importance of all aspects of carbonization.

The author said he was interested to hear from Mr. Veryard that their experience in this subject ran in parallel with his own undertakings. Mr. Veryard had also emphasized the importance of the bracing being designed to close the expansion spaces. The 'after expansion' which they experienced was not due to incorrectly fired silica. With regard to check testing of refractories, they certainly claimed the right to inspect them at the makers' works whenever this seemed desirable. Mr. Dougill noted that Mr. Veryard objected to sorting material into 'under' and 'over' sizes. There was no doubt, however, that much advantage could be obtained from that practice, which was adopted even in the mass production of engineering components which were produced to very fine tolerances.

In reply to Dr. Pexton, he had noted the difficulties which he had overcome by the use of water cooled tie-bars, and thought he was stressing a very important aspect of any cooling system, namely that it must be absolutely reliable. He knew that the system he had described had worked well, and was pleased to say that their air cooling system had given no trouble for over six years.

Dr. Haffner had raised some very interesting points, particularly in connection with 'change of material.' His own opinion was that a change of material, particularly in the retort or chamber itself, was usually called for due to a necessary change of qualities rather than cheapness. Mr. Dougill agreed, however, that the difference in expansion was usually aggravated by a fall in temperature at that point. They did not think that the normal 'sliding joint' was of advantage, particularly in the case of vertical retorts where a long joint occurred. Rather surprisingly, it did seem to work satisfactorily, even on a second heating, when it was fairly obvious that the graphite lubricant had been burnt out. Mr. Dougill said he could assure Dr. Haffner that the elastic bending of the buckstays and bulb rails did partially recover when the horizontal setting was cooled down. The setting, however, did not shrink externally to the original size, so that the whole of the deflection did not disappear. He agreed very strongly with Dr. Haffner that it was extremely undesirable to design vertical retorts where the back wall of the producer continued upwards as the front wall of the setting. This practice caused considerable distortion. In calculating expansion allowances, joint compression should not be allowed for if ground quartz was used for jointing material, since this expanded considerably. With less refractory jointing materials, some allowance was desirable.

Collapsible Washers

He agreed with Mr. Moys on the difficulty of keeping both sides of a horizontal setting at even temperatures during heating; it was, however, possible to do it with the Beckton settings. As regards the use of collapsible washers between the bulb rails and the buckstays these could only be used successfully where the design was such that the division walls did not expand outwards and cause deflection of the buckstays. Where collapsible washers were used, it was, therefore, necessary to ensure that practically all the load on the buckstays came from the expansion of the retorts.

Mr. Dougill said he was very interested in Mr. Moy's report of the achievement of a satisfactory horizontal retort supported on silica and firebrick. The arrangements for the differential expansion must have been perfect.

In reply to Dr. Foxwell, Mr. Dougill stated that there were two schools of thought on the question of the use of all silica walls down to the base of the regenerator, versus the use of silica down to the top of the regenerator, and firebrick or siliceous firebrick for the regenerator walls. In his opinion, the all-silica wall gave the best job, for the following reasons. The wall was some 500 in. long. The change in expansion due to the change in temperature was considerable. It was, in fact, from 6.5 in. expansion at the top to 4.0 in. at the bottom and the change was spread gradually over a considerable height. Where a change in material was employed, there was a sudden change in expansion at one course of some 3 in. It was difficult to cater for this and the greater expansion of the silica tended to open cracks immediately below in the less expansible material.

They found that their coke ovens had a useful gasmaking life of some 25 years and when resetting became necessary they would be reluctant to replace the oven section only, so that it was customary for them to rebuild from the base of the regenerator.

WORK OF CONSULTATIVE COUNCILS

The Glasgow and West of Scotland Committee of the Gas Consultative Council has drawn public attention to the fact that it exists for the benefit of the consumer and is ready to undertake any query or complaint on gas service. Experience so far is that the consumer is unaware of the fact that these five bodies were constituted purely for the benefit of the consumer, and that membership consists of representatives drawn from various sections of local public life. Councillor S. Leitch, Chairman of the Glasgow Committee, emphasized this point at a meeting on April 4 when he told the public that in the last resort complaints could be dealt with by the district members of the Consultative Council's committees. Names and addresses of these members could be obtained from the local gas showrooms. The Glasgow Committee also announced that the Scottish Gas Board had carried out investigations into recent gas incidents and accidents and that the Committee was satisfied with the precautions taken by the Board. A new safety device had been examined but had not been found completely dependable.

Iron Bacteria in Gasholder Water

A report of the discussion on the paper presented by A. R. Mitchell, Assistant Works Manager, Bradford Group, North Eastern Gas Board, to the Yorkshire Junior Gas Association on March 12. The paper was published in the ' JOURNAL ' *of March 30, (pp. 845-847)*

Mr. D. C. Henderson, Leeds, the President, opened the discussion by saying that he noted that the author mentioned the passing of water over crude naphthalene with a strength of five parts per mill. to which apparently the bacteria became acclimatized. Mr. Henderson enquired if a stronger solution would become more effective.

Mr. Mitchell replied that this was the largest amount of naphthalene that could be dissolved in water at normal temperatures by passing the water through a bed of naphthalene crystals. A suspension of naphthalene crystals in water could be obtained with the aid of a wetting agent, but constant agitation was required to prevent the crystals settling.

Mr. P. C. Egan, Leeds, said the paper dealt with the important subject of corrosion, a subject which would require closer attention in the future if high maintenance charges were to be kept in check. Gasholders were particularly subject to corrosion owing to the continued immersion of steel plates in water and their subsequent exposure to the atmosphere. This paper served to spotlight the influence of bacteria upon the corrosion process. With regard to the assimilation of iron by iron bacteria was not the iron incidental in the process since the bacteria were utilizing the acid radical of a dissolved iron salt for their growth? By that means oxygen was free for further cathodic attack, which in turn caused more iron to pass into solution. Hence the bacteria were increasing the rate of corrosion rather than being the sole cause. The paper indicated to Mr. Egan that the bacteria could directly attack metallic iron and he would like to know if that was so. He was surprised that the author had not mentioned vibrio, which were so often associated with gasholder water. Were vibrio absent in the case of this particular holder altogether? These bacteria were recently found in a holder quite near the bottom of the tank. With regard to killing or inhibiting bacteria, had the author investigated the effect of aeration?

Mr. Mitchell, replying, said that by the removal of the iron, oxygen would be absorbed for bacteria metabolism—*i.e.*, anaerobic conditions. Some types of iron bacteria could attack metallic iron directly. As far as vibrio was concerned, Mr. Mitchell said he purposely did not mention this as it was another problem altogether. He would not be surprised to find them present in any gasholder which had organic matter present. As with most other types of bacteria, they could lie dormant until conditions suited their growth, when multiplication occurred very rapidly. As iron bacteria were found in great numbers in natural, often fast flowing, streams, aeration was considered unsuitable; also it would promote corrosion.

Mr. P. M. Owens, Tingley Laboratory, said some of the statements and experimental evidence appeared to him to be rather inconclusive and subject to doubt. For instance, the simultaneous presence of ferric hydroxide and iron bacteria in holder water did not necessarily confirm that these organisms were responsible for the precipitation of ferric hydroxide, because (a) iron bacteria were ubiquitous, occurring in natural waters, and (b) ferric hydroxide (in several forms) was a normal product of corrosion, occuring quite often without the presence of iron bacteria.

The problem of discolouration which was due to ferric hydroxide sheaths appeared to be more of a problem of normal corrosion since the iron was utilized by the organisms in the form of iron salts, which were the products of corrosion; also there was no conclusive evidence that iron bacteria attacked the metallic iron directly. Work done by D. Ellis —' Iron Bacteria in Relation to Incrustation of Pipes '—and work done in America by F. N. Speller—' Corrosion Causes and Prevention '—indicated that iron must be in solution before the organisms could use it.

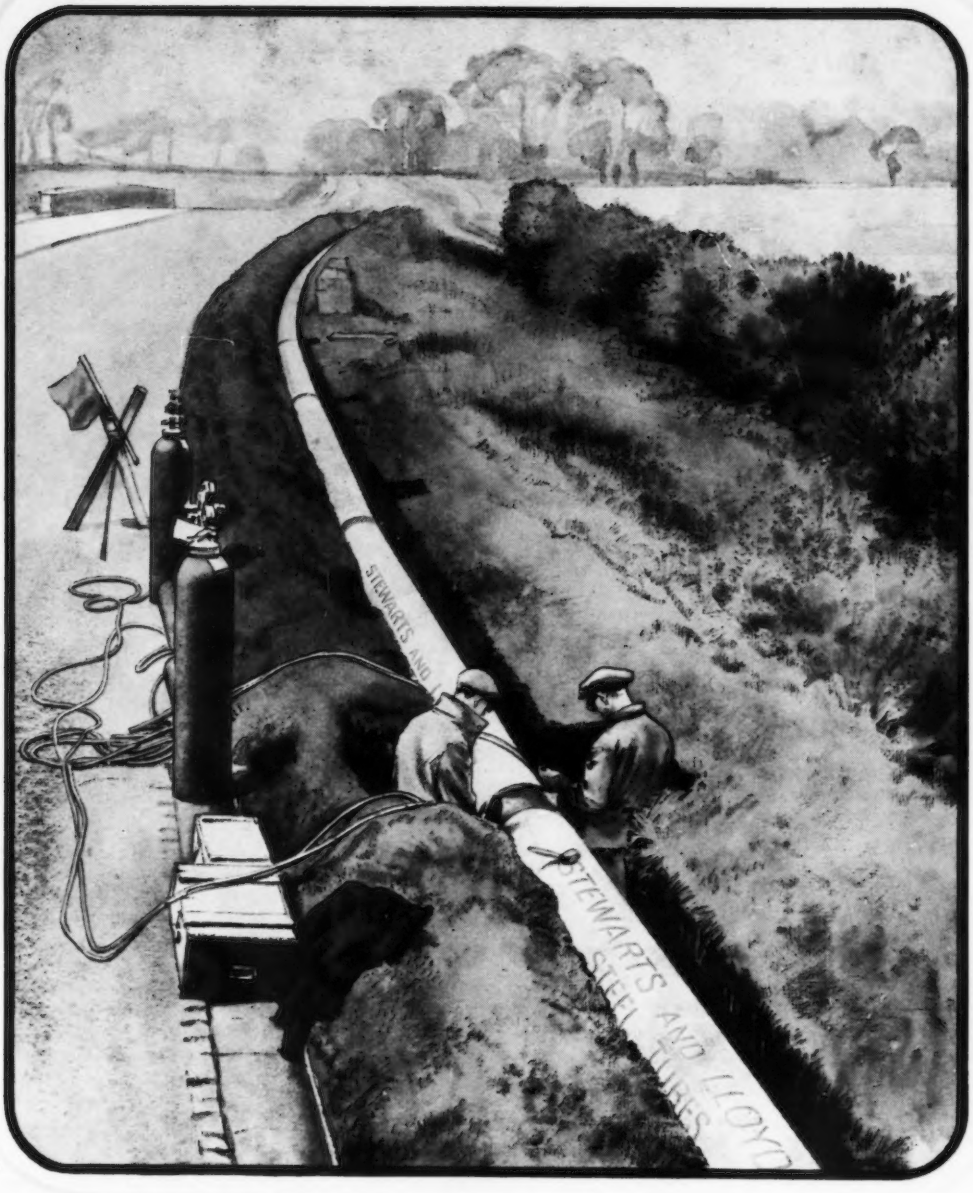
Furthermore, the experiment described in the paper, which was said to illustrate the work of the specific bacteria, was subject to doubt because the spirovibrio, for which this holder water was not examined (responsible for the production of hydrogen sulphide under suitable conditions), would give identical reactions to those described, that was opalescence and gelatinous precipitate on standing in sunlight. Also, a certain amount of precipitation of ferric hydroxide would be expected with a solution of iron salts (most probably ferrous bicarbonate) after standing for a number of days. Finally, with reference to the addition of sodium hydroxide to the water, the subsequent decrease in iron content (due to precipitation of ferric hydroxide) and the failure of the iron to re-appear was due, according to the paper, to the inhibition of the iron bacteria by raising the *p*H above that of the optimum *p*H range for that specific organism. But was it not equally reasonable and more fundamentally important that on the addition of sodium hydroxide to the water, followed by rise in *p*H from 6.6 to 7.5, conditions arose in the holder water which retarded corrosion (by lowering the concentration of hydrogen irons and the possible formation of a film of ferrous hydroxide), thus preventing the return of iron into solution and the consequent precipitation of ferric hydroxide?

Mr. Mitchell said that owing to the fact that iron bacteria were relatively large in size their identification was not difficult under a microscope, especially when examined before and after treatment with HCl to remove the ferric hydroxide sheath. Chemical analysis proved the presence of ferric hydroxide.

In the experiment mentioned numerous microscopical tests were made during the period, and in each case the number of iron bacteria was found to be increasing. The water was tested for the presence of hydrogen sulphide, which was found to be in trace quantities only. Throughout the life of this holder there had been no troubles due to hydrogen sulphide being liberated from the water. No ferric sulphide was present in the precipitate. He repeated that he would be surprised if vibrio, together with countless other types of bacteria, were not found in most gasholders, but until conditions suited them they would not multiply and cause trouble. He quite agreed that a *p*H of 7.5 was desirable in gasholder water to keep corrosion to a minimum. As this also prevented any soluble iron salts being converted into gelatinous ferric hydroxide by bacteria which covered the paintwork, two birds were killed with one stone. Some forms of iron bacteria did attack metallic iron. Those which caused corrosion in pipes were usually gallionella ferruginse, which could live in the absence of light, whereas it was usually crenothrix found in gasholders.

Mr. G. Griffiths, Group Distribution Engineer, Bradford, opened his remarks with the observation that he was aware of Mr. Mitchell's interest in the breeding of tropical fish and the general problems involved in providing suitable small tanks and satisfactory surroundings for development. From the paper, however, it would appear that he had very much enlarged the size of the tank and tremendously reduced the scale of the organisms if his paper gave any indication on the matter. Mr. Griffiths said he thought one point which had been overlooked in the discussion was a development of a suitable form of a protective coating giving the length of life which would justify the treatment which Mr. Mitchell recommended for removing iron stains. In his opinion, it was very difficult to find a protective coating which remained unimpaired and reasonably effective after a life of two years, and this would have to be at least doubled if the cost entailed in preventing or removing the staining were to be justified.

Mr. Mitchell replied to the effect that protective coatings, having an effective life of at least four years, were already available and that he saw no reason why development should not produce a much longer life and that no ill effects need be anticipated from removing the iron stains by the method he had recommended.



THE STEEL TUBE AGE

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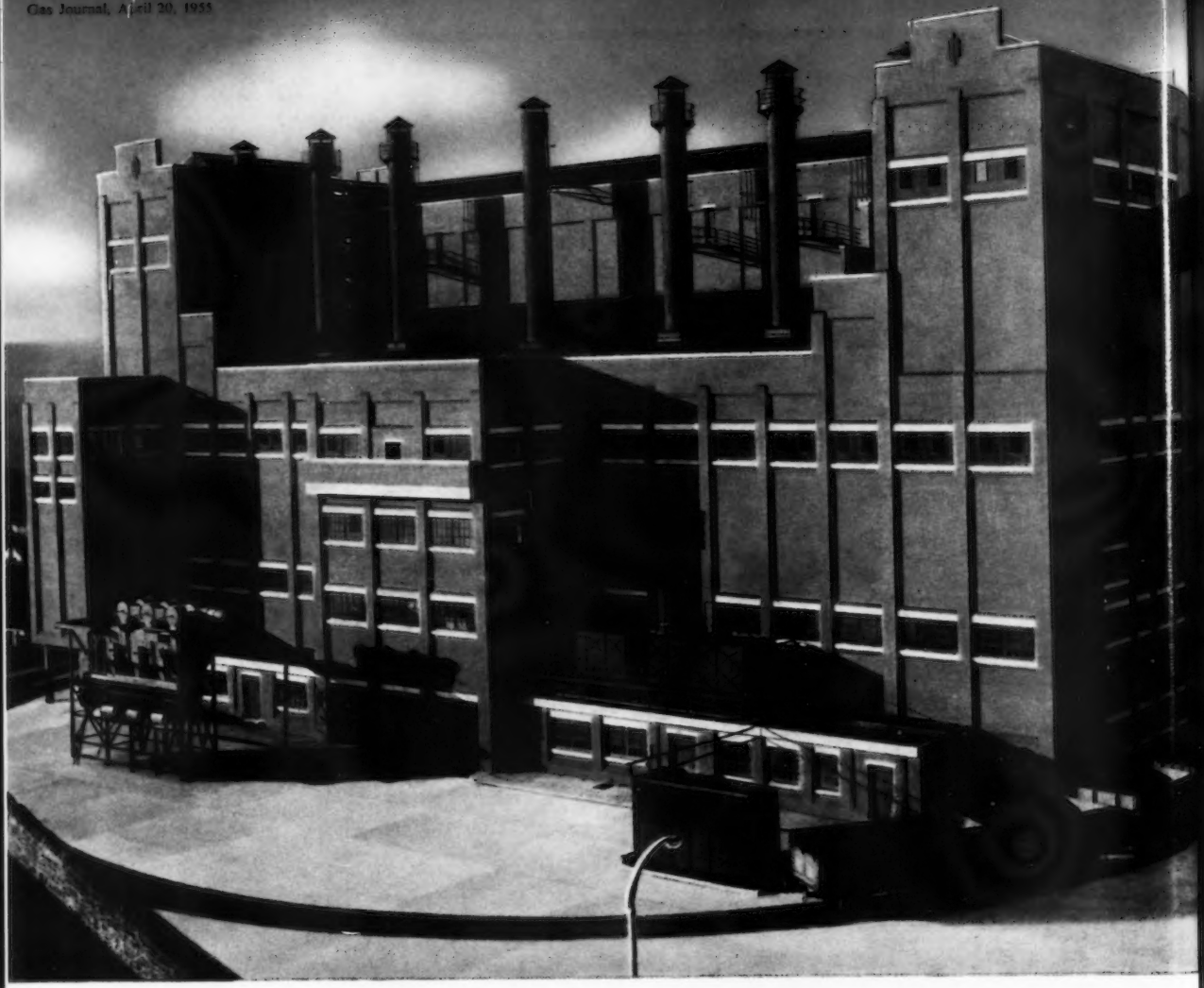

THE NEW PLANT AT ETRURIA

The recently completed installation at the Etruria (Stoke-on-Trent) Works of the West Midlands Gas Board has a nominal daily capacity of 8,000,000 cu. ft and consists of 96 Glover-West Continuous Vertical Retorts in "Balanced Heating" settings, with coal and coke handling plant.

This is the third Glover-West retort house at Etruria, the first having been in operation since 1928. There are now 260 Glover-West retorts at the Works, with a nominal capacity of more than 22,000,000 cu. ft per day.

WEST'S GAS IMPROVEMENT COMPANY LIMITED

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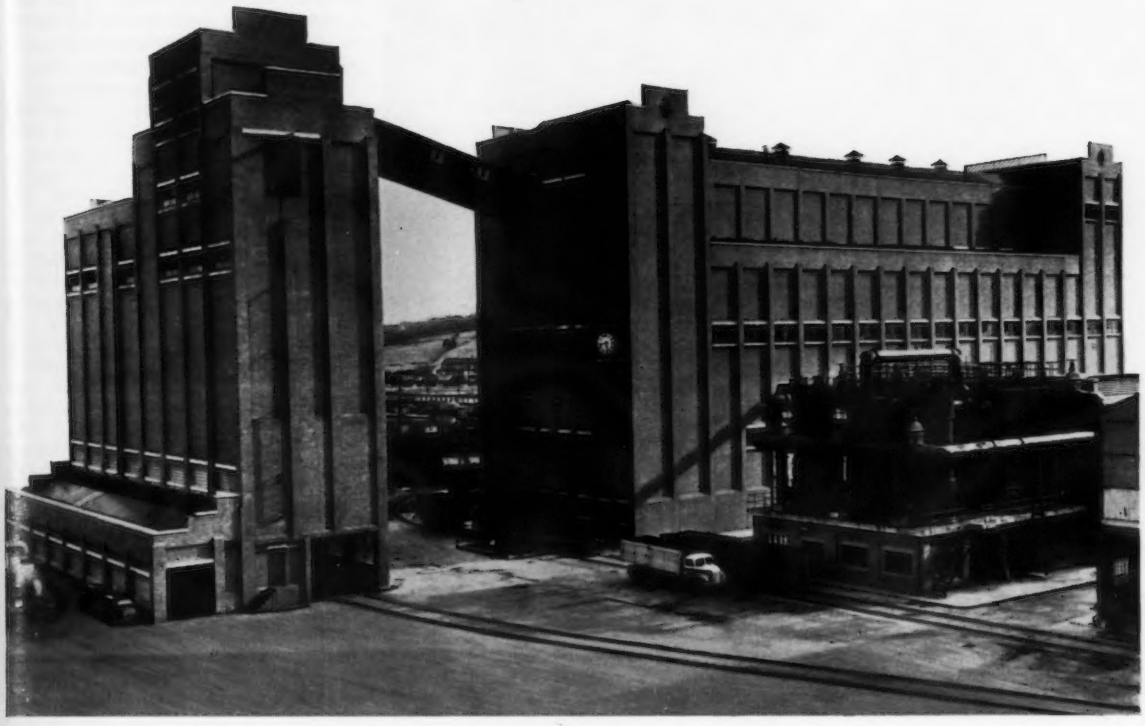

Retort house and coke grading plant from the north.

Etruria, Stoke-on-Trent, Gasworks

We describe the new gas installations at the Etruria works of the North Staffordshire Division of the West Midlands Gas Board, which installations are being inaugurated today by Sir Harold Smith, Chairman of the Gas Council.

THE first gasworks in the district appears to have been erected in 1825 at Shelton, near Etruria, by the British Gas Light Company. During the following years, the British Gas Light Company and other independent companies erected works at Brownhills, Longton, Fenton, Stoke and Longport. The original works at Shelton was later replaced by a new plant built on the east side of the canal at Etruria, but after serving the district for some years, it was found that mining operations under the works had caused considerable subsidence of the ground, thus endangering the safety of the works. In 1900, the British Gas Light Company therefore promoted a Bill for the erection of a new works at Etruria, and in December, 1904, production first commenced on the site of the existing works.

When the 'Five Towns'—really six—Stoke, Burslem, Fenton, Longton, Hanley and Tunstall—were incorporated into one County Borough in 1908, the British Gas Light Company was still supplying gas in Hanley and Tunstall, but Burslem, Stoke, Fenton and Longton were supplied from four separate works, all of which passed into the possession of the County Borough. The acquisition of the interests and property of the British Gas Light Company by the County Borough was finally ratified in the Stoke-on-Trent (Gas Consolidation) Act of 1922, the purchase price being £345,000. Plans were at once proceeded with for the centralization of gas manufacture at Etruria. The construction of the first section of the necessary plant, sanctioned by the Ministry of Health in 1923, was completed in 1924. Gas was supplied from Etruria to Stoke and Fenton and the old works in these two towns were closed down. In 1925 the title and status of City was conferred upon the County Borough, which thus became the City of Stoke-on-Trent.

The second portion of the scheme to be proceeded with was the erection of chemical plant, a project which was put before its intended place in the scheme to provide work for the relief of unemployment in the district. In 1924 sanction was given to the borrowing of money to erect tar distillation and sulphate of ammonia plants and houses, tar liquor storage, together with coal storage and the steel high-pressure mains between Etruria and Longton, and Etruria and Burslem. This portion of the scheme was completed by the end of 1926. The final stage of centralization comprised the reconstruction of the horizontal retort house, increasing its daily capacity to 3 mill. cu.ft., and the erection of a Glover-West vertical retort plant with a capacity of 3,750,000 cu.ft. together with the corresponding ancillary apparatus. Centralization was complete, and the new plant was inaugurated by the Rt. Hon. Stanley Baldwin, M.P. (later Earl Baldwin), on April 27, 1928.

This retort capacity, together with the 1,500,000 cu.ft. daily capacity of a water-gas plant, was sufficient to meet the gradually growing needs of the six Potteries towns and the surrounding district until the industrial load began to expand rapidly after the erection of the first gas-fired continuous tunnel oven in 1932. Indeed, the recent history of the gas undertaking is bound up with the phenomenal expansion in the last twenty years of the use of town gas for the firing of all types of ceramic ware. In 1933, gas consumed for pottery firing amounted to 37,786,800 cu.ft. out of a total gas con-

Fig. 1. Glover-West retort house: gas offtakes and coal feeders.

sumption of 1,622,123,442 cu.ft. By 1939, the total gas sales were double those of 1933, and the gradual conversion of the old bottle-type solid fuel fired oven to the continuous gas fired tunnel kiln was making ever-increasing demands upon production at the Etruria works.

With the knowledge that further production plant would be required to meet post-war demands, sanction was obtained in 1944 for the building of a 6 mill. cu.ft. per day vertical retort extension, and this was later increased by the addition of a further 2 mill. cu ft. extension. In addition, a 6 mill. cu.ft. per day carburetted water gas plant was erected and put into operation in November, 1948. Although gas consumption for pottery firing remained constant during the war years, its growth from 1945 was limited only by the provision of plant to meet the demand. It is estimated that output for the year to March 31, 1955, will reach 9,500,000,000 cu.ft.—an increase of over 50% since nationalisation and a truly phenomenal figure.

When the undertaking was vested in the West Midlands Gas Board in May, 1949, plans for further expansion were already well in hand, as there was still a large potential demand from the ceramic industry and allied trades which could not be fulfilled until further production plant was installed. This could be achieved only by building an entirely self-contained new works, and for this purpose a site adjacent to the existing works was used which had been bought from the Wagon Repair Company.

There are now 300 gas-fired tunnel ovens in operation, with a total annual consumption in 1954 of 5,179,149,000 cu.ft., and this field of consumption represents almost 90% of gas sold for all industrial purposes. It can readily be seen that, in addition to assisting in increasing the efficiency of the industry, the use of gas in the Potteries has actually changed the physical appearance of the district by eliminating the old bottle kilns, with a consequent reduction in atmospheric pollution.

In addition to pottery firing, large quantities of gas are now used locally for a great variety of industrial and commercial processes, including clay drying, frit firing, bone calcination, baking of plastics, paint drying, metal melting, steam raising, food preparation, etc., and all types of central heating.

Reference must also be made to the rapid expansion of domestic sales, due to the extensive housing programme of the City of Stoke-on-Trent. New Corporation houses are being built on several large sites on the outskirts of the City, and the district now has over seventy-three thousand domestic consumers. It should be noted that since the war the City has built more houses per thousand of population than any other large municipality.

Looking to the future, there is every prospect of a still greater application of gas for use in industry, and in addition to giving every possible service and assistance to domestic consumers, it is the desire of the West Midlands Gas Board to increase the efficient usage of gas both in the domestic field and in all branches of industry and commerce.

Coke Oven Gas

In addition to gas manufactured at Etruria, supplies of purified coke oven gas have been received since 1938 from the coke ovens of the Birchenwood Gas and Coke Company at the rate of approximately 2 mill. cu.ft. per day. This supply is transmitted direct to the distribution mains in the northern part of the area where industrial requirements are particularly high, an arrangement which is particularly advantageous because these supplies relieve the load on the gas compressing plant delivering gas under pressure to this particular area. In 1935 a contract was arranged for the supply of unpurified gas from the Shelton Iron, Steel & Coal Company whose coke ovens are situated in the vicinity of the Etruria works. At present the quantity of gas received from this source is in the region of 5 to 6 mill. cu.ft. per day.

Etruria Works

The necessary official sanction was given early in 1944 for a comprehensive scheme of extension to enable Etruria works to produce an additional 6 mill. cu.ft. of gas per day. The first section of the Glover-West continuous vertical retorts with a daily capacity of 6 mill. cu.ft. equipped with coal and coke handling and screening plant, together with condensers, washer, electrostatic detarrer and exhausters, was brought into operation in February, 1946. The carbonizing plant consisted of three benches each with 24 retorts, 50 in. by 10 in. by 25 ft. in length. It was further extended in 1950 by the addition of a fourth similar bench bringing the total daily capacity of this line of plant to 8 mill. cu.ft.

Gasmaking capacity was again increased in 1948 by the installation of two sets of carburetted water gas plant by the Power Gas Corporation. Each unit is of 3 mill. cu.ft. daily capacity. Gas storage capacity had been brought up to a total of 13,715,500 cu.ft. by the addition of a 5 mill. capacity waterless gasholder erected by R. & J. Dempster, Ltd., and put into commission in 1949.

As the existing works could not be further extended, it was necessary to obtain a completely new site, and after prolonged negotiations the undertaking obtained an adjoining site occupied by the Wagon Repairs Company at Cliffe Vale, for the building of the extension. The proposed capacity of the new plant was 8 mill. cu.ft. per day, and formal approval of the project was eventually granted in 1948. When the gas industry was nationalized in May, 1949, the project, together with the general layout and design of the plant was formally approved by the West Midlands Gas Board. The Ministry of Works subsequently authorized a starting date of June, 1950.

New Plant on Wagon Repairs Site

The Wagon Repairs Site is situated in the S.E. corner of Etruria gasworks, alongside the main railway line from the North to London, with an area of approximately 4.8 acres. The new plant is a completely self-contained unit of 8 mill. cu.ft. daily capacity from retort house to wet and dry purification, arranged upon the minimum possible area consistent with leaving sufficient room for access and operation. The adoption of the tower type purifier allowed the plant to be arranged across the site in four parallel lines at right angles to the main British Railway lines, containing respectively:

(1) the retort house and coke-screening plant (titleblock),

(2) the detarrers, condensers, exhausters, reciprocating gas compressors, generator and switchgear house and ammonia washers,

(3) the oxide store shed and tower purifier installation,

(4) the building containing Connersville station meters and calorimeter room, benzole washers, tar and liquor wells, benzole recovery plant, water circulating pump house, rail weighbridge house, water cooling tower.

The Glover-West Carbonizing Plant

The 96 Glover-West 50 in. continuous vertical retorts are grouped in four separate benches each of three settings, each setting containing eight retorts in heating units of four (Fig. 1). The settings are designed, as those of 1946, for balanced heating. Fuel gas is supplied from pressurized integral step-grate producers, one to each setting, coupled together, however, by common external producer-gas flues one to each bench, with branches to the individual settings and the necessary control dampers. Primary air is supplied to each bench from a motor-driven fan (which is duplicated) by way of a common duct with branches to each grate: steam is injected into each branch.

Following the valuable work of the British Refractories Research Association on the behaviour of refractories at Etruria, advantage has been taken in this installation to compare under identical conditions some of the standard materials now available. Retorts and combustion chambers in each of the four benches have therefore been built in a different refractory material. The intention is to keep them under observation and to report to the industry in due course.

Waste-heat from the retort settings is recovered in three Spencer-Bonecourt boilers. Each boiler is capable of dealing with the gases from two of the four benches, but is designed to work efficiently on reduced loading when all three boilers are in operation. Alternatively each boiler can be stood off for cleaning as required. The boilers are designed to raise steam at a pressure of 180 lb. per sq. in. superheated to 150°F. above saturation temperature, at the rate of 4 lb. of steam per lb. of coke consumed in the producers. The induced-draught unit of each boiler consists of a Sirocco fan with 20% volumetric overload capacity driven by a Greenwood and Batley geared back-pressure steam turbine exhausting at 30 lb. per sq. in.

Coal Supply

Coal is received from rail or road at both ends of the retort house. In each position there are duplicate hydraulic ram wagon-tippers arranged so that wagons can be discharged at either end. The Wallers tippers are of the cradle type which lifts the wagon clear of the track. Motive power, sufficient to deal with wagons up to 25 tons capacity, is produced by a duplicate set of Dawson and Downie vertical three-throw pumps delivering 2,000 gal. per minute at 380 lb. per sq. in. and activited through gearing by 14 h.p. electric motors.

The coal is discharged into a 25-ton receiving hopper extended on the outer side to receive coal from road vehicles. Below each receiving hopper is a mechanically operated and adjustable reciprocating feeder, delivering coal to a West single-roll coal breaker capable of reducing 80 tons of coal per hour to sizes not exceeding 2 in. cube. From the breaker, or bypassing it from the feeder, coal passes to an inclined steel tray conveyor delivering to West lip-bucket conveyors arranged across the end bays of the retort house and supported in steel towers built independently of the retort benches.

The main coal plant is at the coke plant end of the retort house and here the lip bucket conveyors are in duplicate; at the railway end a single line of conveyor provides a standby. The conveyors are of West's standard design, each driven Radicon totally enclosed worm reduction gear and one final pair of machine cut gears. These conveyors receive coal from tray conveyors and deliver it to either of the 42 in. band conveyors over the coal bunkers above the retort benches.

Coal storage bunkers above the retort benches are of a capacity equivalent to 48 hours' supply of coal to the retorts. Ventilation pipes are taken vertically through the bunkers to discharge warm air from the charging platform level to the upper zone of the retort house.

The duplicate 42 in. flat band conveyors distributing coal to the bunkers are reversible, receiving coal from the L.B. conveyors at either end of the house. Each band is equipped with four travelling ploughs (two facing each direction of travel), lowered to the band or raised from it as required, and the belt is supported at discharging points by four sets of close-pitched idlers (Fig 2).

Coke Handling

Coke is discharged from the retorts by extractors of the vertical helical type driven by reciprocating bars actuated from the end by an electric motor with vertical steam engine as standby. Independent sets of extractor driving gear are provided at both ends of the house, arranged so that either can be used to drive the whole plant, or alternatively each can drive half.

From the extractors, coke passes by way of a travelling chute to either of two 36 in. wide band conveyors arranged in a longitudinal trough below the retort house floor. The conveyors are reversible so that coke can be conveyed to either end of the retort house. At the coke-plant end it is elevated by one or other of the L.B. conveyors and delivered to either of the duplicate 30 in. troughed band conveyors which cross the yard and deliver to the grading plant above the coke storage bunkers; or it may be delivered to the producer and retort-feed hoppers at that end of the house. At the railway

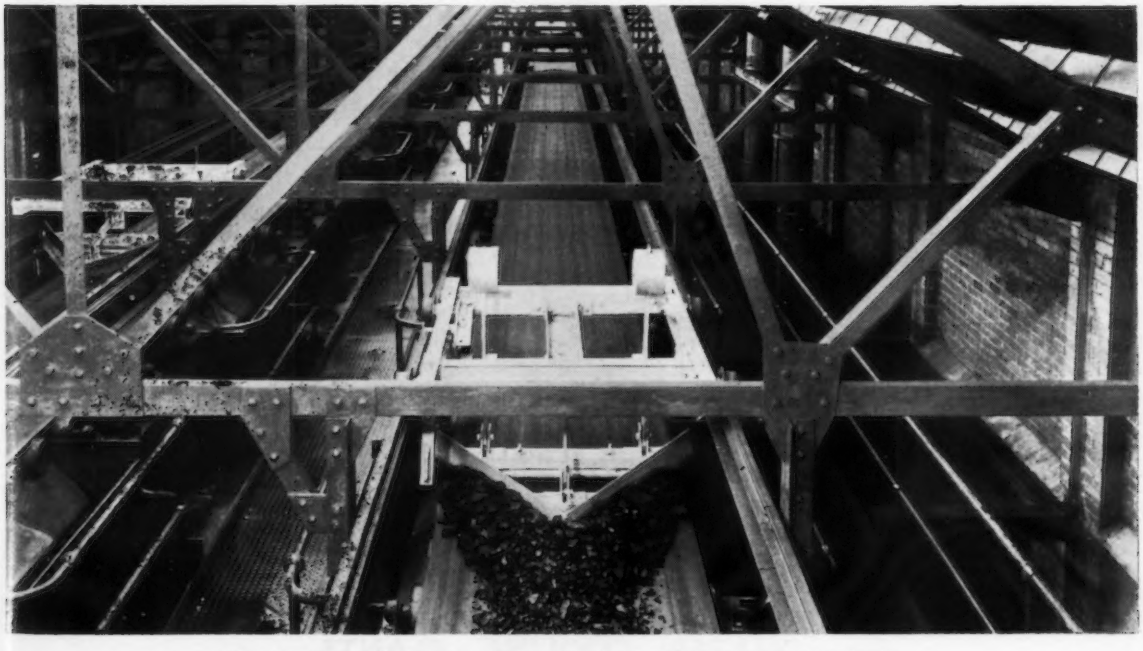

Fig. 2. Glover-West retort house: flat band conveyors over coal bunkers.

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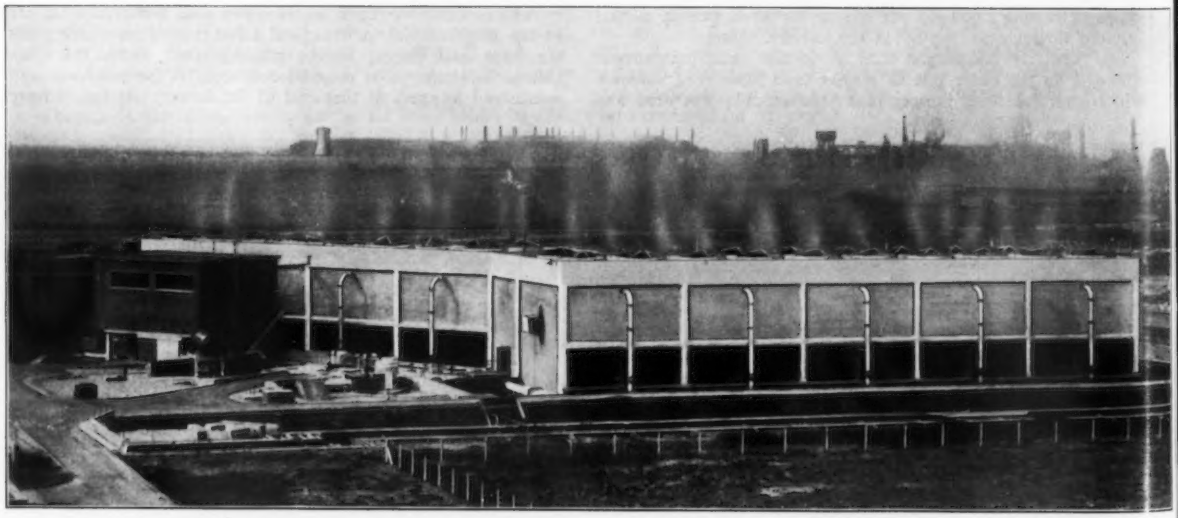
end it is elevated and delivered by the single lip-bucket conveyor into the 175-ton coke storage hopper, or a producer feed hopper, or a retort feed hopper. The coke can be discharged from the 175-ton hopper into road vehicles or it can be reclaimed by chute to either of the band conveyors below the retort benches and thence to the grading plant.

Coke Grading and Storage

Coke from the overhead band conveyors passes to a West-Calvert coke cutter or direct to either of two lines of screens. The coke cutter is rated at 35-40 tons of coke per hour reduced to 2 in. cube. There are two parallel lines of screens, one of the Pegson-Telsmith vibrating type, the other of West's selective (band) conveyor type. (Fig. 3.)

The Pegson line consists of a primary screen with 2 in. mesh, a second screen with 1¼ in. mesh, a third one with ¾ in. mesh and a breeze screen with ⅜ in. mesh. The West's selective screen conveyor is a normal flat band conveyor with screening units mounted above the band at an angle across the line of travel. The screening units are built on the comb principle with fingers of steel rods faced with chromium deposit and welded to a supporting bar of mild steel. These units are supported in flexible spring-steel shock absorbers and fitted with electrical vibrators which impart to the fingers oscillations of high frequency and small amplitude. Thus, while no vibration is imparted to any section of the supporting structures, clogging is effectually prevented. The spacing of the combs is similar to the meshing of the several Pegson screens.

The coke storage bunkers with the grading plant above and the loading platform below are built as a tall structure encased in brickwork similar in architectural appearance to the retort house building. The total storage capacity is 700 tons divided into five compartments for coke over 2 in., through 2 in. and over 1¼ in., through 1¼ in. and over ¾ in., through ¾ in. and over ⅜ in., and breeze through ⅜ in. The body of the bunkers is constructed of rolled steel sections,



THE ABOVE ILLUSTRATION DEPICTS A WATER COOLING TOWER INSTALLATION OF THE MECHANICAL INDUCED DRAUGHT TYPE. TO ACHIEVE THE VERY EXACTING DUTY SPECIFIED A TOTAL OF 36 FANS ARE EMPLOYED WHICH ARE SITUATED IN THE ROOFS OF THE TOWERS. THE INTERNAL FILLING IS EXCEPTIONALLY COMPACT, CONTAINS THE LATEST IMPROVEMENTS AND IS SO DESIGNED TO MINIMISE OPERATIONAL COSTS. IN THE BACKGROUND TOWARDS THE LEFT CAN BE SEEN A 160 FEET HIGH NATURAL DRAUGHT HYPERBOLIC TOWER FOR A SERVICE REQUIRING A LESS STRINGENT PERFORMANCE

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brick filled. The internal surface of the steelwork and internal bracing is protected against abrasion by 'Gunite.'

Seven outlet chutes are provided along one side of the 'cones' (which are a continuous trough along the base of the bunkers), each with a fixed Pegson de-freezing screen, for feeding railway wagons on a branch line of the sidings. On the other side there is a bag-filling platform with seven outlet chutes from the bunkers leading to a travelling de-freezing screen and a travelling Avery automatic bag-filling and weighing machine. Breeze can also be fed to a breeze band conveyor.

Condensers and Detarrers

There are three Holmes primary condensers of conventional vertical tube design arranged overhead on a reinforced concrete structure. They are arranged to work in parallel. Each has a normal capacity of 5 mill. cu.ft. per day.

Three Holmes-Elex electrical detarrers are arranged on the same overhead structure as the primary condensers. Each detarrer is capable of handling 5 mill. cu.ft. of gas per day measured at S.T.P., but in the hot saturated condition.

The condenser and detarrer assembly is arranged to allow great variation in working conditions during condensation to assist in maintaining some control on the composition of the final works effluent. (Fig. 4.)

The main possibilities are to operate the system:—

(1) Hot gas detarring only.
(2) Cold gas detarring only.
(3) With two detarrers on the hot gas followed by one detarrer on the cold gas.

Exhausters

Two high-speed Holmes-Connersville exhausters have been installed, each mounted on a cast iron baseplate and direct-coupled to a 110 h.p. Bellis & Morcom vertical two-crank non-compound steam engine. (Fig. 5.) Each exhauster is rated at 12.9 mill. cu.ft. of gas per day and is capable of working against an outlet pressure of 48 in. W.G., while maintaining a vacuum of 6 in. W.G., when running at 366 r.p.m. with a power consumption of 98 h.p. The exhauster house instrument panel was supplied by Electroflo Meters Co., Ltd.

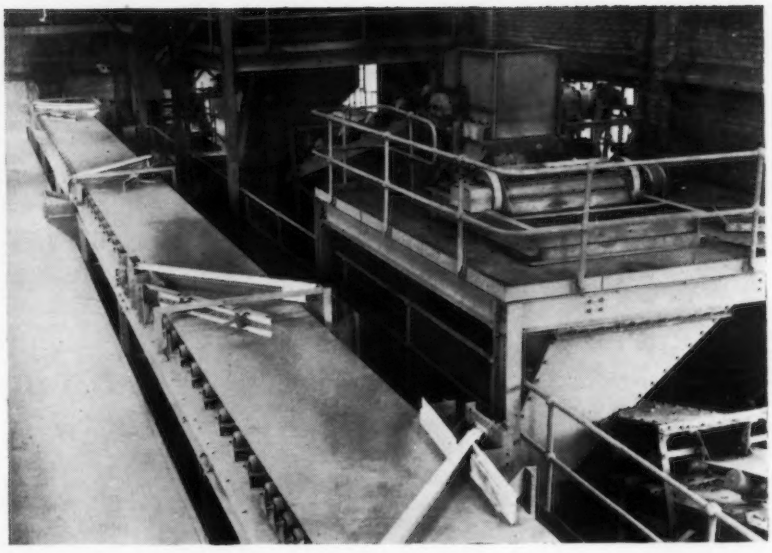


Fig. 3. Coke grading plant. Left: selective screen conveyor. Right: vibrating screens.

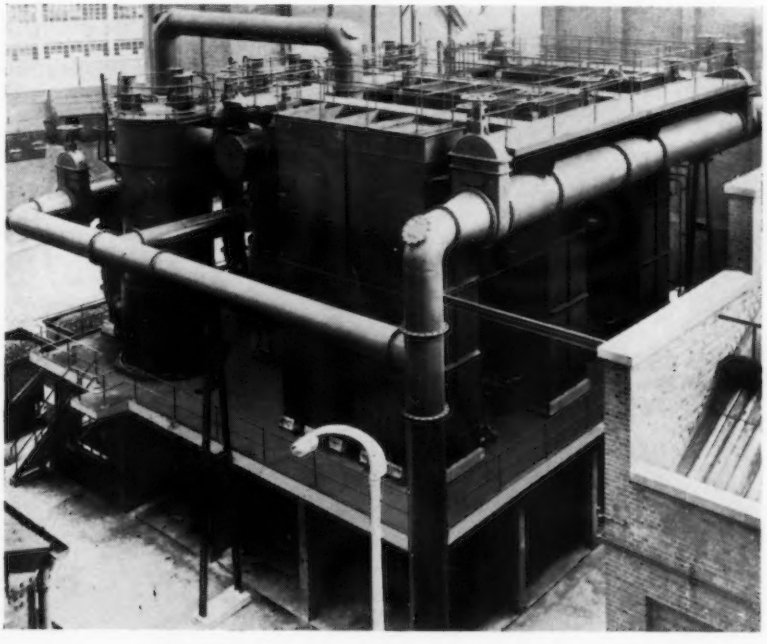


Fig. 4. Detarrers and vertical tube condensers.

Tar and Liquor Handling

The main storage well is divided into four compartments for the reception of:—

(1) Works liquor for disposal.
(2) Liquor from retort house circulation and hot gas detarrers.
(3) Tar from retort house and detarrers.
(4) Light creosote oil separated from the gas following the hot gas detarrers.

The essential feature of the system is the separation of condensates into two aqueous and two hydrocarbon fractions with minimum loss of time. The polyhydric phenols which cause trouble during the bacterial oxidation of liquor effluents are segregated to a considerable extent from liquor for disposal.

Two Holmes static multifilm washers, connected in parallel, are provided to remove ammonia. Each washer is in the form of two six-bay units in series, an arrangement which gives ample standby capacity.

Dry Purification

The dry purification plant consists of a set of tower purifiers installed by W. C. Holmes & Co., Ltd., with a working capacity in one stream of 10 mill. cu.ft. per day. There are six working towers, each 22 ft. 3 in. dia. by 52 ft. 9 in. high, each tower holding twelve double layer containers of octagonal form provided with timber grids. (Fig. 6.)

The towers are arranged with a bottom gas chamber into which the gas enters and flows up the continuous gasway formed by the individual gasways in each container. Gas connections are provided for backward rotation working of the towers, the valves being manufactured by R. & J. Dempster, Ltd. A stocking tower and stocking frame of similar dimensions to the working tower are also included, together with a spare set of containers to be kept filled with

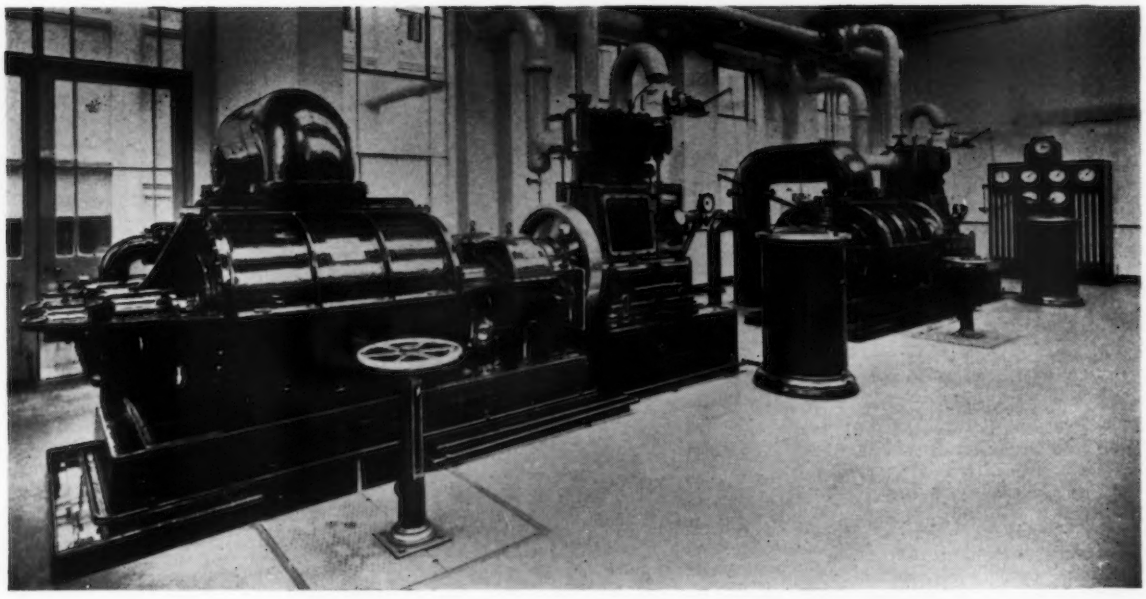


Fig. 5. A view in the interior of the exhauster house.

fresh oxide for speedy changing of any of the towers. The purifier set is served by a 60-ton Goliath crane of 64 ft. span with a speed of 17 ft. per minute on the main lift; by the use of this any tower can be completely emptied and refilled in a working day. Revivification air can be introduced to any tower by means of Connersville blowers driven by two-speed flameproof motors.

Spent oxide is broken out of containers placed on an overhead gantry through bottom openings. The spent oxide falls into a roll crusher by British Jeffrey Diamond, Ltd., and immediately through a Crone & Taylor's disintegrator. The normal capacity of the handling plant is 20 tons of spent oxide per hour.

Benzole Recovery

The benzole recovery plant installed by W. C. Holmes & Co., Ltd., is designed to extract 85% of the available benzole from the gas. (Fig. 7.) Two static multifilm washers of the counter-current type are provided for washing the gas from the new retort house. (Fig. 8.)

Benzolized oil from these washers, and also from washers extracting benzole from other streams of gas on the works, is stripped by the vacuum distillation process which was introduced several years ago by W. C. Holmes & Co., Ltd., and the former Gas Light and Coke Company. The new washers have a capacity of 10 mill. cu.ft. per day, while the oil-stripping section, having an hourly oil circulation design rate of 8,500 gal. per hour, is planned to handle oil from washers having a total capacity of 20 mill. cu.ft. of gas per day. (Fig. 7.) An interesting feature of the plant is the thermostatically-operated fire extinguishing apparatus installed in the pump house which would quickly release a large quantity of carbon dioxide should any undue temperature rise occur in that part of the plant.

Fig. 6. General view of the tower purifiers.

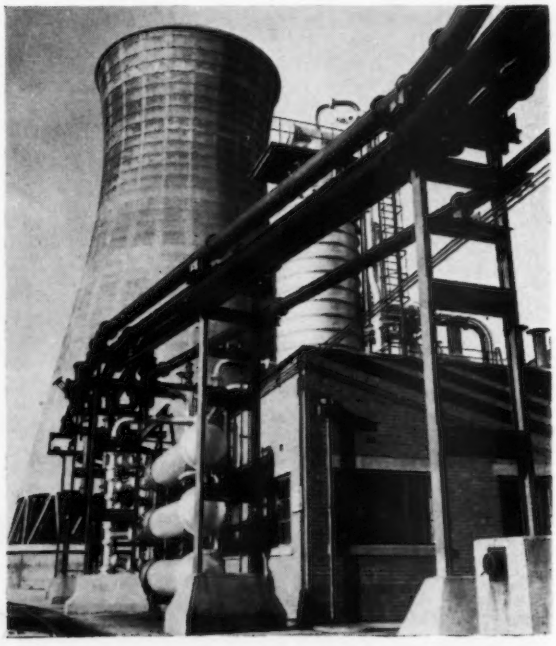


Fig. 7. Cooling tower and benzole plant from railway.

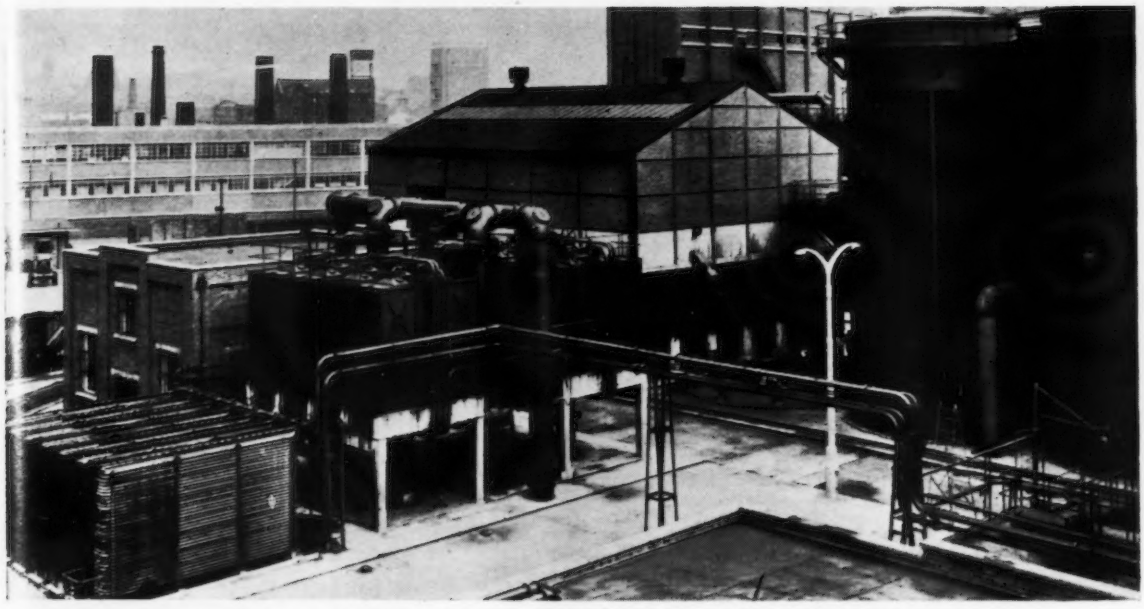


Fig. 8. Countercurrent benzole washers and rack coolers, tower purifiers and oxide store shed.

Steam Raising and Utilization

The steam raising plant consists of three Spencer-Bonecourt multi-tubular waste-heat boilers situated in the retort house. The steam, which is generated at 180 lb. per sq. in. and 150°F. superheat, is fed into a high pressure steam main from which supplies are taken for process requirements in the retort house (steaming of retorts and producers), driving the waste-heat boiler induced draught fans and feed pumps, the steam engines of the Holmes-Connersville exhausters, and the turbine-driven pumps of the crude benzole plant. The surplus steam is used in turbo-alternators to generate electricity or is passed by means of a surplus steam valve into the existing works steam main.

Except for the alternator turbines, which are of the condensing type, all these steam users are designed to work against a back pressure and discharge into a low pressure steam range designed for a normal working pressure of up to 30 lb. per sq. in.

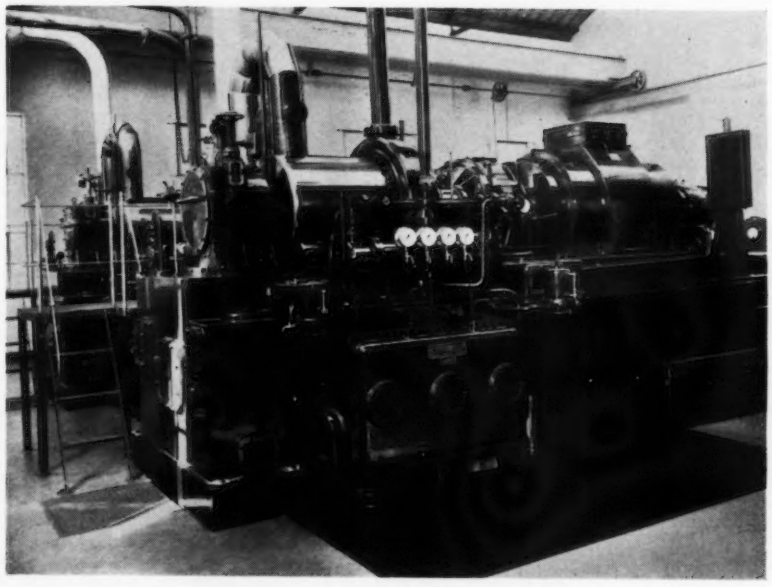


Fig. 9. One of the two 1,000 kW. turbo-alternators.

Electricity Supply

With the exception of one or two steam users, all the prime movers have been arranged for electric motor drives operating on a 415 V, three-phase, 50 cycle supply. There are two 1,000 kW turbo alternators. (Fig. 9.) These alternators generate at 6,600 V and feed on to busbars at one end of an E.H.T. switchboard and then, by way of two 750 kVA transformers, to a 415 V switchboard. At the other end of the E.H.T. switchboard a supply is taken from either of two feeders provided by the Midlands Electricity Board and then through two further 750 kVA transformers to a separate section of the 415 V switchboard.

Instrumentation

Instrumentation for the retort house and ancillary plant has been kept down to the minimum consistent with efficient control of the various operations. The instruments which are generally of the indicating and recording type have either been mounted locally where they can be observed while adjustments are being made, or grouped together and mounted on suitable multi-unit panels for remote control.

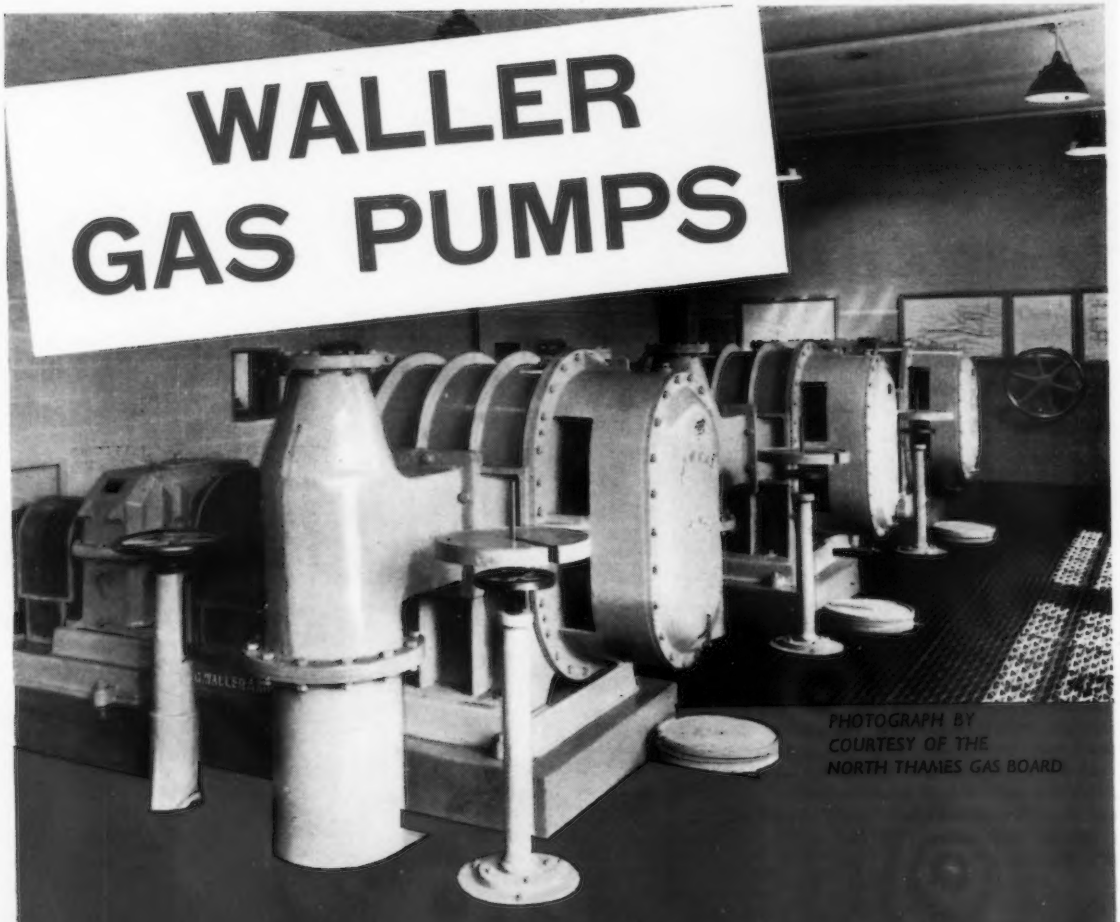
The instrument panel in the engine house records pressure conditions at the inlet and outlet of the exhauster, and indicates the steam pressure in the high and low pressure mains together with the steam and gas temperatures. Eight single tube pressure gauges indicate gas pressures in the several sections of ancillary plant. The benzole plant panel contains pressure, temperature and flow meters, all indicating and recording, for the proper control of the vacuum distillation plant.

Instrumentation for condensing, detarring and purifying plants includes temperature measurements on gas and cooling water lines and differential pressure measurement on each purifier tower.

Station Meters

For measuring the volume of gas produced there are two 22 in. by 16 in. Holmes-Connersville positive displacement type station meters, each with a normal rated capacity of 450,000

WALLER GAS PUMPS



PHOTOGRAPH BY COURTESY OF THE NORTH THAMES GAS BOARD

What's in a name — Gas Pump, Booster or Blower they all do the same job and the name does not matter.

But the makers of such machines do matter and that is why Waller Gas Pumps are so often installed.

GEORGE **WALLER** & SON LTD.

PHOENIX IRON WORKS • STROUD • GLOS.

Telephone Brimscombe 2301/2

MEMBERS OF THE SOCIETY OF BRITISH GAS INDUSTRIES

c.ft. of gas per hour, suited to the measurement of purified gas up to a maximum pressure of 48 in. w.g.

Gas Compressors

Situated in the same house as the exhausters are two variable speed, motor-driven, vertical, reciprocating two-crank gas compressors, each having a capacity of 400,000 cu.ft. of gas per hour at a maximum pressure of 15 lb. per sq. in. (Fig. 10.) The compressors are of George Waller & Son, Ltd.'s manufacture, and the direct drive consists of Laurence Scott and Electromotors, Ltd., protected type, 'N.S.' variable speed, 496 h.p. commutator motors controlled by induction regulators and contactor type control panels operating on the 415 V supply. These machines are used for pumping gas from the 5 mill. cu.ft. capacity waterless gasholder by way of a 20 in. diameter high-pressure steel main, through governors into the low pressure distribution system.

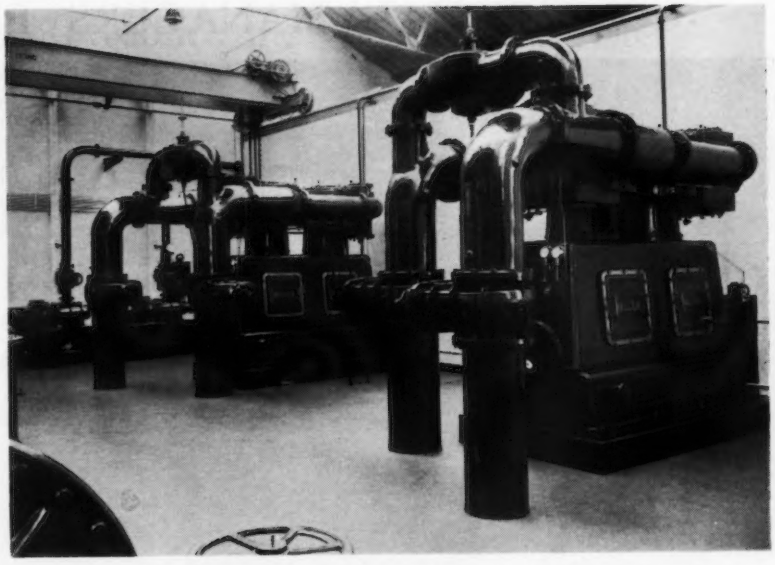


Fig. 10. The motor-driven variable speed gas compressors.

Electrical Equipment

With the exception of the waste-heat boiler fans and boiler feed water pumps the whole of the plant is electrically driven. The motors are designed for a three-phase, 50 cycle, alternating current supply at 415 V. All are of Lancashire Dynamo & Crypto's totally-enclosed dust-proof gasworks type.

The starters for the motors of the coal and coke handling system are mounted on a composite control panel housed in an annexe to the retort house. The control panel is complete with all necessary interlocking contacts and switches to ensure the correct sequence starting and stopping of the several motors. An important feature of this arrangement is the master panel placed centrally in the control panel. On this panel are mounted the selector switches for the several sequences and the 'visual flow' mimic diagram which indicates by coloured strips and lamps the actual units which are in operation. (Fig. 11.) In addition to these safeguards over 70 push-button stops are provided in the immediate vicinity of every motor and at numerous other points in the run of the several conveyors.

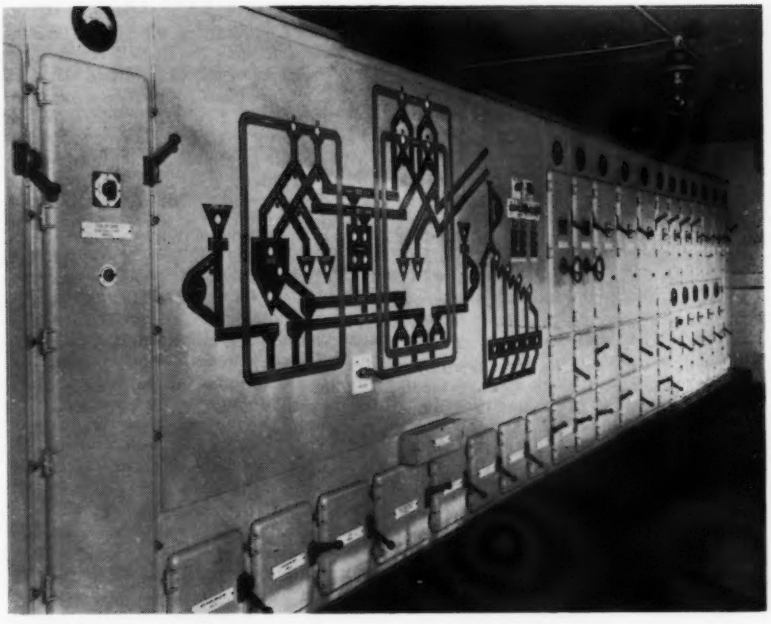


Fig. 10. The motor-driven variable-speed gas compressors.

LIST OF CONTRACTORS

Carbonizing plant .. .. .. (Foundations by West's Piling & Construction Co., Ltd., electric installation by W. H. Smith & Co. (Electrical Engineers) Ltd., electric motors by Lancashire Dynamo & Crypto Ltd., control gear by Brookhirst Switchgear Ltd., wagon tippers by George Waller & Son Ltd., waste heat boilers by Spencer Bonecourt Ltd., dust extraction plant by Drummonds Patents (Hldgs.) Ltd., vacuum cleaning plant by British Vacuum Cleaner & Engineering Co. Ltd., instrumentation by Walker Crossweller & Co. Ltd., electric lift by Etchells, Congdon & Muir Ltd., weigher by W. T. Avery Ltd.)	West's Gas Improvement Co. Ltd.
Ancillary plant .. .. .. (Condensers, detarrers, multifilm washers, exhausters, benzole plant, station meters, tower purifiers)	W. C. Holmes & Co. Ltd. (Sub-contractors: 'Goliath' crane—Stothert & Pitt Ltd., reinforced concrete supporting structures, buildings and foundations including benzole plant house building, F.C. Construction Co. Ltd.)
Gas compressors	G. Waller & Son Ltd.
Turbo-alternators, Turbines .. .. alternators ..	Bellis & Morcom Ltd., Metropolitan-Vickers Electrical Co. Ltd.
H.T. and L.T. switchgear	Metropolitan-Vickers Electrical Co. Ltd.
Water cooling tower	Davenport Engineering Co. Ltd. (sub-contractors: Hoist & Co.)
Tar and liquor pumps and water pumps	Joseph Evans Ltd.
Tar and liquor well	F.C. Construction Co. Ltd.
Road and rail weighbridges ..	W. & T. Avery Ltd.
Railway sidings	T. W. Ward Ltd.
Exhauster house, meter house, and calorimeter room, water pump houses, railway and road weighbridges houses, entrance gates, wall and road.	C. Cornes & Son Ltd.
Laying of underground gas main from meters to gasholders and gasholder to compressors.	R. & M. Douglas Ltd.
Water and steam pipes column supports.	Shelton Iron Steel & Coal Co. Ltd.
Steam mains	Le Bas Tube Co. Ltd.
C.I. main and specials	Clay Cross Co. Ltd.; E. & W. H. Haley Ltd. Manor Engineering Co. Ltd.
Lined steel water mains	Stewarts & Lloyds Ltd.
Steam valves	Hopkinsons Ltd.; J. Blakeborough & Sons Ltd.
Lagging work	William Kenyon & Sons Ltd.
Supply and laying of cables.	Edison Swan Electric Co. Ltd.
Overhead cranes in exhauster and power house.	Vaughan Crane Co. Ltd.
Cabling work for switchgear	Metropolitan-Vickers Electrical Co. Ltd.
Electric capstans	T. Broadbent & Co. Ltd.
Fairweather recording calorimeter ..	Scientific & Projections Ltd.
Income H.T. feeder cables, cubicles and switchgear.	Midlands Electricity Board.
Lead-in siding connections	British Railways Executive.

COMMERCIAL MANAGERS ENTERTAINED

Following the bi-monthly meeting of the Commercial Managers Committee of the Gas Council held at Gas Industry House on March 17, members of the Committee were entertained jointly by the Eastern and North Thames Gas Boards. After being joined by the Chairmen, Deputy Chairmen, and senior officers of both Boards, the Committee were taken to the Casino Theatre to see 'Cinerama,' going on afterwards to dinner at Kettner's Restaurant.

During the dinner, when our photograph was taken, Mr. Michael Milne-Watson, Chairman of the North Thames Board, welcomed the guests, referring to two members of the Committee, Mr. J. E. White (appointed Deputy Chairman, Northern Gas Board) and Mr. W. K. Tate (shortly taking up an appointment with Glover & Main, Ltd.) both of whom were attending this Committee for the last time. Mr. Milne-Watson also welcomed Mr. A. F. Hetherington who was attending his first meeting of the Committee since taking up his appointment as Commercial Manager, Southern Gas Board.

Sir John Stephenson, Chairman of the Eastern Board, as joint host, also made a short speech of welcome to members of the Committee, and a vote of thanks to the two Boards for their hospitality was proposed by Mr. R. H. Bone, Commercial and Sales Officer, Scottish Gas Board.

COMPANY NEWS

NEWTON CHAMBERS

The directors of Newton Chambers & Co., Ltd., recommend a final dividend of 9% to make a 15% total on a one-class reorganized capital of £2 mill. for the year 1954. A year ago 30% was paid on £653,040 ordinary and £146,960 participating preference. The preference were converted into ordinary, making £800,000, and raised to the present total by way of a 150% scrip issue. The distribution requires £165,000 against £132,000 for 1953. Group profits expanded from £726,057 to £768,015 and the net profit from £163,290 to £317,738.

MARYBOROUGH GAS

A dividend of 6%, an increase of 1% over preceding years, was declared at the 77th annual general meeting of the Maryborough (Queensland) Gas and Coke Company, presided over by Mr. H. Williams. The Directors reported that the demand for gas continued on the up grade and sales for the past 12 months established an all time record. Sales of residual products showed a substantial increase over 1953. Another pleasing feature of the year's operations was that expenditure showed a considerable decrease as compared with 1953. This was accounted for principally by a saving in production costs as a result of the new carbonizing plant recently installed at the works. To cope with the increasing demand for gas, it had been necessary to have a third bed of retorts installed. Tenders were invited for this work and that of Norman J. Hurll & Co. of Melbourne, was accepted. The contractors have given an undertaking to have the additional new retort setting installed in readiness for the winter demand for gas and the Company will then be in a position to satisfy the expected increasing demand for some years ahead. Profits after writing off £3,600 for depreciation, transferring £700 to reserve fund, and £2,000 to reserve for plant renewals and contingencies amounted to £8,854.

LONDONDERRY GASLIGHT

Twenty-three mill. cu.ft. more gas was produced by the Londonderry Gaslight Company in 1954 than in the previous year. This was stated in the Chairman's address with the report and accounts for the year ended December 31 last. After taxation the profit for the year amounted to £16,046—an increase on the previous year. After transfers to the special purposes fund and the renewal fund, a balance was carried forward to the profit and loss account of £2,907. The Chairman, Captain B. F. McCorkell, said that a table relating to the progressive increase in the demand for gas showed that where-322,882,000 cu.ft. had been produced in 1949, in 1954, 359,670,000 cu.ft. was produced. In 1939, the output was only 177,887,000. Captain McCorkell said: 'There has been a tremendous increase in output which actually exceeded in one day 1½ mill. cu.ft., and for the first two months the increase has been 5 mill. cu.ft. over and above the increase that we experienced during the same period last year. These large increases in gas have been met by our retort plant and with less carburetted water gas thus required gave us an increased quantity of coke for sale during the year. Further expenditure is contemplated to meet the increased demand for coke from both industrial and domestic users.' As he had mentioned in his address last year, heavy capital expenditure was necessary to keep the works up-to-date. the principal item being the extension of the retort plant, which was completed. The demand for space-heating appliances and water heaters continued, and the reintroduction of the hire purchase system, which was highly popular, was assisting still further to make the appliances popular than ever. Captain McCorkell referred to another matter which would require consideration 'very shortly.' With the ever increasing demands on the undertaking, if it was to be kept up-to-date, more capital would be necessary, and the directors proposed, when it seemed suitable, to increase the capital structure of the undertaking. A final dividend of 4%, less tax, was proposed, making a total of 7% for the year.

Radiation Ltd. Introduce the 'HEATMASTER'

We were recently permitted to see the first appliance developed in Great Britain to provide the three services of house heating by ducted warm air, water heating and cooking, from one unit. This was the 'Heatmaster,' the latest brainchild of Radiation Ltd., and an appliance which owes much to the Company's experience with heat storage cookers and the whole-house warming unit. It is also believed to be the first cooking appliance developed anywhere, capable of burning coke or coal, which provides thermostatic control over a full range of oven temperatures.

The 'Heatmaster' provides full oven and hotplate cooking facilities for six to eight people and all the hot water required for household needs, including baths. Ducted warm air maintains full comfort conditions throughout the ground floor rooms up to a floor area of 350 sq. ft., and background warmth in the rooms above. The average weekly fuel consumption for this thermostatically controlled service is 2 to 2½ cwt. in the winter and 1½ to 1¾ cwt. in the summer. This rate of fuel consumption can be adjusted according to the service required. Comparison can be made with the modern controlled-draught inset fire which, on a weekly fuel consumption in winter of 1½ to 1¾ cwt., simply heats the average living room and, at that, with big variations in temperature from floor to ceiling and according to the distance from the fire. The 'Heatmaster' operates at an overall efficiency of 80% and has a space heating efficiency of 55% as compared with an efficiency of 23% to 25% for the modern coal-burning inset fire.

Satisfactory Tests

To be of any practical value, improved standards of service and comfort must go hand in hand with fuel economy. Tests show that really significant savings on household fuel bills can be achieved by the 'Heatmaster.'

The appliance has been subjected to exhaustive laboratory tests in the course of its development. Now, in pursuance of the normal practice of Radiation Ltd., exacting field tests are being conducted in different parts of the country. The first tests, in a block of new maisonettes above shops at Earl Street, Coventry, have just been concluded.

The tests aroused considerable local interest and the results have been highly satisfactory. In view of this, it was decided to accept the opportunity kindly offered by the Lord Mayor and City Council of Coventry to demonstrate one of these installations before the tenant moved in. The demonstration unit which we saw installed in No. 144 Much Park Street is a development model and will be subject to detailed modifications in the light of the complete series of field tests.

Radiation, Ltd., secured the co-operation of Mr. D. E. E. Gibson, lately City Architect and Planning Officer of Coventry, in the installation, during October, 1954, of five development models in the Earl Street maisonettes. The regulations for Coventry's smokeless zone, which shortly will include Earl Street, require that only smokeless fuels shall be burned. The 'Heatmaster' operates equally well on smokeless fuels such as coke and on bituminous coal, which it burns virtually without smoke. This is significant in view of the rapid increase in the number and area of smokeless zones and smokeless estates envisaged in forthcoming legislation, coupled with the present limits of smokeless fuel production. Radiation Ltd. regard smoke reduction not only as an act of grace but also as a sign of efficiency, for of course smoke discharged from the chimney pot signals unburnt, wasted fuel and therefore wasted heat.

Primarily a Cooker

In essence the 'Heatmaster' is a free-standing insulated solid fuel cooker and water heater connected to a heat exchanger which incorporates a short length of flue jointing the cooker to the main brick flue. The fire box operates on the normal up-draught principle when burning coke and other smokeless fuels, and on down-draught when burning bituminous coal. Secondary air is introduced to ensure the effective smokeless combustion of coal.

The cooking and water heating service can be operated whether or not the room heating service is required. The oven thermostat controls the primary air supply to the furnace and thus the rate of burning. The fuel bed is in direct contact with an 'L'-shaped boiler and the products of combustion pass over a heat transfer plate which conducts heat to a convection chamber surrounding the main oven. Beneath the main oven is a slow-cooking or plate-warming oven. Both ovens have enamelled linings. A highly efficient fast-boiling and simmering service is provided by the passage of flue gases beneath the hotplate. An indication of the flexibility of the system will be gathered from the capacity of the hotplate to bring a quart kettle to the boil in 7½ minutes from raising the oven thermostat setting after an overnight period of 'idling.' In normal operation the boiling time is 2½ minutes. The flue gases pass into the heat exchanger after heat has been extracted for oven and hotplate services.

The oven thermostat ensures the maintenance of the desired temperatures within the insulated cooker unit regardless of the room heating demands. The output for room heating is further controlled by the room thermostat, usually placed in the living room where it can conveniently be set at the desired temperature.

When the room thermostat calls for heat, a fan is automatically switched on and draws air from a suitable point, such as the upstairs landing. Air is passed around the heat exchanger, some passing through the convection chamber surrounding the oven and thence into the 'mixing' chamber, some passing direct into the 'mixing' chamber. The air is then directed to a suitable point or points in the living space at a constant temperature equivalent to the full rated output of the heater, until the required room temperature is reached, when the fan is switched off automatically. In homes with enclosed downstairs rooms (as distinct from the 'open' plan) lower

This is how the 'Heatmaster' is installed in the Coventry maisonettes which are designed on the open plan. The air outlet register and room thermostat are in the partially seen living room.

FAULTLESS PERFORMANCE

As the ballerina's faultless performance and flawless appearance delight her critical audience, so the faultless performance and flawless appearance of the Century Cooker delight the critical housewife . . . as the ballerina's perfect dancing is the result of years of training and practice, so the Century is the result of R. & A. Main's years of experiment and research.

Always to the forefront in improving the efficiency of the gas cooker, R. & A. Main Ltd. have been "first in the field" with many outstanding features . . . in 1922 Main introduced the simplified form of cooker construction . . . in 1927 Main were first with an all-enamelled cooker . . . and in 1935 Main introduced the first all-sheet metal cooker.

The No. 20 Cooker was the first chassis-less model to be produced and marketed in Britain, and it was also the first cooker to incorporate an oven-flue vent discharging in front of the backplate. The high efficiency and popularity of the Century has indeed proved the worth of Main's years of constant research.

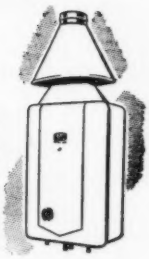
MAIN No. 20 CENTURY GAS COOKER

C4

Note the name-made by MAIN

R. & A. MAIN LIMITED
LONDON and FALKIRK

there is a MAIN water heater for every domestic purpose . . .

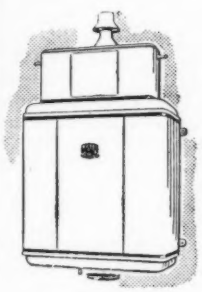


instantaneous for a complete household service . . . the M.I. Multipoint

instantaneous for the bath . . . the New Junior

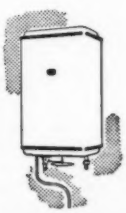
instantaneous or storage

for a complete household service . . . the G.L.C. Circulator



storage for a complete household service . . . the Thermain No. 15

storage for the sink or lavatory basin . . . the Thermain No. 2



MAIN WATER HEATERS Ltd.
Gothic Works, Thornton Rd. Croydon Surrey
W13

temperatures can be maintained in any room by closing the register to the duct supplying warm air to that room.

It will be noted that the heating systems for cooking and room heating are interrelated. Thus when the full demand for both services is being made upon the heater, heat superfluous to the cooking operation is passed under thermostatic control into the room heating system.

Room heating and cooking control is completely automatic. Four manual operations only are involved: Setting the room thermostat, setting the oven thermostat, clearing the fuel bed, and refuelling. In addition, the air control has to be set for the type of fuel burned —down-draught for coal and other dense fuels, up-draught for coke and other smokeless fuels. Clearing is easily effected by operating the handle controlling the shaker grate. Stone, clinker, etc., are simply removed by turning the 'dumper' handle. Refuelling is normally required only once in 24 hours during the summer months. In winter, refuelling is usually necessary only twice in 24 hours when burning coal and other dense fuels, two to three times when burning coke.

For maximum fuel economy the room thermostat setting should be reduced at night or when the rooms are unoccupied. This entails no discomfort since temperatures are recovered much more quickly than by any other form of continuous or intermittent heating.

The rated output is as follows: Space heating: 15,000 B.Th.U. per hour, water heating, without space heating, 6,000 to 8,000 B.Th.U. per hour (7 to 9 gal. raised from 50° to 140°F.), and with space heating, 8,000 to 10,000 B.Th.U. per hour (9 to 11 gal. raised from 50° to 140°F.). Overall efficiency is 80%, according to output, and space heating is 55%, according to output. Fuel consumption averages 1½ to 1¾ cwt. per week in summer, and 2 to 2½ cwt. per week in winter.

Eastern Section I.G.E. Visits Watford and St. Albans

Members of the Eastern Section of the Institution of Gas Engineers celebrated 'Chairman's Day' on April 14 when, following luncheon at the Watford Town Hall as guests of the Eastern Gas Board, they visited two of the principal works under the care of this year's Chairman of the Section, Mr. W. A. Evetts, M.C., Divisional Engineer, Watford Division. Sir John Stephenson, C.B.E., Chairman of the Eastern Gas Board, was unable to attend owing to another engagement, and the members were therefore welcomed on behalf of the Board by Mr. T. C. Battersby, Divisional General Manager, Watford Division, who was himself Chairman of the Section three years ago when the members visited the St. Albans works on a similar occasion.

Mr. Evetts, presiding at the luncheon, welcomed the guests of the Section, among whom he mentioned Mr. E. O. Rose, who, although a member of the Section, attended in his capacity as Chairman of the London and Southern Section; Mr. W. R. Garrett, Chairman of the North of England Section, with two members of his staff (whose presence, Mr. Evetts suggested, showed that the north was ready to learn something from the south); Mr. Gordon Hall, Town Clerk of Watford; Mr. R. F. Robinson and Mr. H. E. Wilks, Chairman and Secretary respectively of the Eastern Junior Gas Association; Alderman E. T. Warren, J.P., Divisional Secretary and Accountant, Watford Division; and Mr. B. R. Almond, Residuals Manager, Watford. He also welcomed Mr. J. H. Greenacre (Great Yarmouth), Senior Vice-Chairman of the Section, looking fairly well again after his illness. He regretted the absence of Mr. Sydney Smith, Chairman of the East Midlands Gas Board and a member of the Section, and Mr. Bernard Clarke, Divisional General Manager, Lincoln, and immediate past Chairman of the Section, due to important duties which kept them in their own area.

He proposed the toast of the Eastern Gas Board, through whose hospitality they were able to meet under such pleasant circumstances.

Mr. T. C. Battersby, responding, said he had been asked by Sir John Stephenson to express his regret at his inability to attend, owing to another engagement. Sir John, he said, took a great interest in the Eastern Section, and had asked him to convey his best wishes for a very successful visit. Mr. Battersby went on to say that it was a great personal pleasure to him to see Mr. Evetts in the chair of the Section. They had been colleagues for more than a quarter of a century, and strangely enough they were still on speaking terms. Mr. Evetts appeared before them as Divisional Engineer of the Watford Division, but his own association with him went back to the days when he knew him as a golfer and later as a bowler. He also knew him as a boy scout—not one of the short panted variety but as a scouting administrator who had done a great deal of work for a very fine movement. Latterly he had known him as a tireless and indefatigable officer of the Eastern Gas Board. On behalf of the Board, Mr. Battersby welcomed the members of the Section on their visit to the Watford and St. Albans works. Such visits, he said, were of great value because they afforded opportunities for exchanging views and experiences and to help one another. The Eastern Section, like other district sections, was following in the traditions of the old associations of gas engineers and managers—organizations which were founded on the principle of helping one another.

The visits to the two works were optional, and approximately half the party went to each. The Watford works, as Mr. Evetts remarked at the luncheon, is still almost entirely a horizontal retort works, very little water gas being manufactured. Approximately 2,000 mill. cu.ft. of coal gas (including dilution gas) is made each year, all from modern horizontals. Two retort houses each contain two benches of six Gibbons horizontal recuperative settings, eight retorts per bed, retort dimensions being 24 in. by 16 in. by 23 ft. long with internal producers, constructed in 1938 and 1949. Two benches are equipped with the standard design scrubber stand pipe and off take connections in cast iron. The two newer benches are equipped with steel scrubber stand pipes with 4 in. steel and cast iron offtake connections. The normal carbonizing cycle is 12 hours and the average weight of charge carbonized is 19¼ cwt. Daily output is 4.25 mill. cu.ft. at 620 B.Th.U. per cu.ft.

Features of note are the recirculation of waste gases in the setting; flat topped producers with Hadfields steel lids; light design of stokers' tools, the suspended charging stopper and the method of control of coal charging according to a 'seconds' clock, developed by the works staff.

The water gas plant comprises one Davidson & Partner unit with a capacity when carburetting of 1 mill. cu.ft. per day, and one Humphreys & Glasgow unit of 1 mill. cu.ft. per day. Both sets are manually operated and clinkered. Either of these plants is used to make producer gas for dilution purposes.

Two Sturtevant fan type boosters with a capacity of 350,000 cu.ft. per hour are used for low pressure distribution. Two compressors, a Reavell motor driven and a Bryan Donkin steam engine driven, each capable of delivering 100,000 cu.ft. of gas per hour at pressures up to 10 lb. per sq. in., are provided to send gas to Rickmansworth holder station, some governor controlled supplies for housing estates being taken off en route. The North Watford holder station is a central distribution point, the connections and equipment being arranged for receiving or sending gas from or to Watford, St. Albans, and Hemel Hempstead gasworks. Watford works is operated as a base load station and in the past year produced over 1,800 mill. cu.ft. of gas.

A start is being made with the erection of a complete gasification plant. The

visitors saw the piling work in progress. By way of contrast between the modern and the ancient some of them were introduced to Peter, the 20-year-old horse which performs many useful duties on the works. When the works was flooded in March, 1947, motor transport was temporarily brought to a standstill, and it was Peter who came to the rescue.

The St. Albans works, which many of the members had visited in 1952, is the largest in the Watford Division, supplying gas through a high pressure grid system to a wide area. The carbonizing plant comprises two vertical retort houses with a capacity of 6.5 mill. cu.ft.; a horizontal retort house of 1.25 mill. cu.ft. capacity; and two 3 mill. cu.ft. per day completely automatic carburetted water gas plants. A new installation of continuous vertical retorts is to be erected.

No. 1 vertical retort house (1951) comprises six beds of eight 50 in./56 in. retorts, each with a normal throughput of 5.3 tons of coal per day and providing 3.5 mill. cu.ft. of gas at 515 B.Th.U. Sector coke dischargers controlled by electronic timers are fitted to these retorts, permitting individual discharges of 2 to 2½ cwt. of coke at intervals ranging from 45 to 60 minutes. No. 2 vertical retort house (1948) has five beds of eight retorts similar to those of No. 1 house but with a normal throughput of 5.6 tons per day, yielding 3 mill. cu.ft. of gas at 525 B.Th.U. This house has worm discharge gear for coke. Both plants have West's balanced heating system with fuel gas generated in independent producers blown by fans. About 8% steaming is practised, and under full gas making conditions this is derived entirely from exhauster and fan engine exhaust. Water is sprayed into coke chambers, and by automatic valves on to coke on the band conveyors. Dilution by 700,000 cu.ft. per day of producer gas can be practised when necessary, the gas being derived from No. 1 house producers.

Nos. 1 and 2 horizontal retort houses contain 90 retorts (24 in. by 16 in.) 20 ft. long in beds of sixes and eights with a combined capacity of 1.25 mill. per day at 600 B.Th.U.

Two self-clinkering Humphreys & Glasgow automatic water gas sets were commissioned in 1945 and 1949 respectively and each produces 3 mill. cu.ft. of gas per day when carburetting up to 500 B.Th.U. quality. The older set is adapted for producing 625/650 B.Th.U. gas if required at peak load to permit maximum vertical retort gas dilution and steaming. The necessary additional heat for gasifying and cracking oil is provided by introducing steam to the blast air.

A third set of similar capacity is in process of erection together with additional coke elevating plant employing a skip hoist to a surge hopper. All three coke hoppers have been deepened and roofed over. Provision has been made for distributing coke from the existing band conveyors and the new surge hopper by reversible shuttle band traversing the range of hoppers.

The new set is adapted for gasifying heavy oil both in the generator and carburettor with hot scrubbing and detarring of the gas en route to the normal Humphreys & Glasgow spiral flow design of vertical tube condenser. Other notable features of the new plant are the larger carburettor, the dry inner seal and elevated coned wash box. Water gas production and consumption are balanced by a 0.6 mill. cu.ft. 3-lift column guided holder.

Soft water is cooled in two open type coolers of Premier design and is delivered by a 40,000 gal. per hour centrifugal pump to the closed vertical retort house and open carburetted water gas condensers, and to the benzole and concentrated liquor plants. Supplies to the ammonia washers and No. 2 vertical retort house coke chamber sprays serve to avoid the gradual accumulation of solids in the system. The closed and open circuits return separately to the coolers, the open circuit water being pumped from a balance tank over the cooling towers by a 20,000 gal. per hour pump. All pumps are of Pulsometer manufacture.

Well water after passing through the horizontal retort house condenser enters a 10,000 gal. per hour Paterson 'accelator' softener working on the 'sludge blanket' principle. The lime-soda suspension is supplied by an electrically driven force pump which is automatically by-passed when the softened water balance tank is filled. Aluminium sulphate solution is normally used to improve the clarity of the softened water. The softened water at about 1.5° residual hardness passes to one of two identical Filtrator stabilizing units with carbonaceous zeolite beds which reduce the hardness to zero. Sulphuric acid and common salt solutions are used to regenerate these units.

Upwards of two thirds of the gas produced at St. Albans is distributed through a high pressure 8 in. to 12 in. dia. ring main supplying Harpenden, Redbourn, Hatfield, Welwyn, Welwyn Garden City, and Elstree. Extensions of this system allow supplies to be passed to Luton and to the Hitchin and Stevenage districts of the Watford Division. Two twin cylinder reciprocating Bryan Donkin compressors, each of 200,000 cu.ft. per hour capacity against 25 lb. per sq. in., were installed in 1940 and 1941. The engines are vertical compound steam units of 350 h.p. each.

A further diesel driven unit of similar capacity was added in 1951. The engine is a 3-cylinder two stroke marine type employing the Harland & Wolff-Burmeister & Wain uniflow scavenge system.

Two Waller Rootes type boosters driven by 455 r.p.m. 64 h.p. Sisson engines supply an 18 in. medium pressure main following the St. Albans-Watford road to the North Watford holder station. These sets handle 125,000 cu.ft. per hour each against 5 lb. per sq. in. outlet pressure. Supplies are taken off en route where necessary through Reynolds mercury governors to supplement local low pressure supplies.

Two three-stage Rateau low pressure boosters driven by 415 V. A.C. squirrel cage induction motors through fluid couplers have been installed and will be commissioned shortly to boost the St. Albans local supply through a ring main. At 2,900 r.p.m. these machines pass 200,000 cu.ft. per hour at an outlet pressure of 30 in., the pressure being controlled by varying the 'slip' in the coupling.

The present annual make is about 3,000 mill. cu.ft., depending to some extent on the production at the other stations of the Watford Division which are operated as base load works. Thus a feature of St. Albans gasmaking programme is that Monday's load may be double that of Saturday. The seasonal fluctuations are also abnormally high, from about 30 to 95 mill. per week under extreme conditions.

The daily gasmaking capacity of the works, including the water gas plant under construction, will be 8.45 mill. cu.ft. coal gas plus dilution gas, and 9 mill. cu.ft. of C.W.G.—*i.e.*, 17.45 mill. by the end of this year. Work on the foundations for a West's vertical retort plant of 5 mill. cu.ft. per day capacity will commence shortly. This will include all the necessary condensing, purifying, coal and coke handling, screening, and stocking plant. Works steam will be passed through a turbo-alternator coupled to the public supply. A large volume of earth will be moved for grading the new site and providing for sidings extensions to the new coal and coke stocking grounds and purifiers. A new turnout to the Railway Executive's system is also being made

Tea was served at both works at the completion of the tour of inspection, and the opportunity was taken to express further thanks to the Board and to the works engineers and their staffs for making the visit so enjoyable and instructive.

When Thieves Broke into the Bute Terrace, Cardiff offices of the Wales Gas Board recently they made an attempt to blow open the strong room where over £1,000 was kept. The attempt was unsuccessful but it joined the strong room lock so that an expert had to be called in to open the door. The night raiders were more successful in the office of Mr. W. G. Mills, Group Accountant, where they blew open a large safe and stole about £50 in unclaimed pay, pensions and petty cash.

Gas Made Available for public supply by the North Western Gas Board in the four weeks ended March 27 amounted to 8,220 mill. cu.ft., and was up by 10% over the amount supplied in the same period of the previous year. During the 52 weeks to the end of March, which corresponds approximately with the Board's sixth financial year, a total of 85,816 mill. cu.ft. of gas was made available, showing an increase of 4½%. Figures of actual sales are not yet available, but the increase in weekly supply is an indication of the trend of sales, and on this basis it seems probable that the Board's sales will show a rise of 4% to 5% over 1953-54 and will amount to about 350 to 355 mill. therms compared with the total of 337 mill. therms sold in 1953-54.

GAS CONSULTATIVE COUNCILS

Joint Meter Reading Experiments

Joint reading of gas and electricity meters was mentioned at a meeting of the North Eastern Gas Consultative Council in Leeds on March 28 when Alderman H. Sutcliffe moved a resolution from the Leeds local committee 'that this committee notes the statement that an experiment on joint meter reading is being carried out and asks the Consultative Council to enquire from the Board when the report on the experiment may be expected.'

Alderman Sutcliffe said they had previously mentioned this matter and had been told that the idea was being experimented with, but they were rather impatient to hear the result.

Alderman W. Regan, presiding, asked Dr. R. S. Edwards, Chairman of the North Eastern Gas Board, if he was yet in a position to make a statement on the matter.

Dr. Edwards said it was true that an experiment had been carried out in a small town in Yorkshire and a firm of management consultants was conducting an investigation not just into the proposed joint reading of gas and electricity meters, but into the whole business of joint rendering and collection of accounts. The firm had been on the job for some considerable time and he thought its report would be available shortly, and it would be submitted at the first opportunity.

Trade Union Attitude

Mr. Wade, Barnsley, mentioned that the trade unions concerned with such a scheme had their misgivings and were not convinced that the joint reading of meters would effect any considerable economy, but they were watching the experiment and would await the experts' report with interest.

When the Council turned to the consideration of manufacturing results, sales of appliances, etc., disappointment in the lack of improvement in the sales of space heating appliances (with the exception of portable fires) was expressed by Alderman Sutcliffe, who said that paraffin heaters seemed to be growing more and more popular for background heating.

Dr. Edwards said he doubted if there was any special tendency on the part of industrial consumers to turn to oil heating, and actually favourable reports were being received of a number of new developments of space heating by gas. With regard to domestic central heating, the Board had no information on the extent of fuels other than gas being used. They were not putting in many new central heating boilers owing to taxation, but were not losing installations already there.

Alderman Whitaker, Todmorden, said appliances for other fuels were being widely advertised and he wondered whether the Board advertised sufficiently the particular advantages of gas heating and whether it had conducted any research into the particular virtues of any of other fuels and of the cost of such fuels. He would like to see comparative costs.

Dr. Edwards assured Mr. Whitaker that the Board would have a look at this matter from that angle and would have enquiries made and if possible some research.

Alderman Whitaker also questioned whether the grid and some of the super gasworks recently put up by the Board were justifying their existence and yielding the results expected of them, and from figures he produced he deduced that proportionately to the Board's outlay output had not always increased; indeed he reckoned that the ratio of manufacturing potential between 1952 and the present time had fallen something like 11%.

Dr. Edwards said they had to judge results over a number of years and, as he had previously said, the initial costs of some of their schemes had been pretty heavy and there had been substantial delays in the delivery of pipes, etc., which had somewhat restricted the progress of manufacture, but he assured Alderman Whitaker that the Board was well satisfied with progress and results so far.

Gassing Fatalities

There was a short discussion on recent gassing fatalities, particularly during frosty weather.

Alderman H. Sutcliffe reported that his Leeds committee was concerned at what seemed to be inevitable fatalities from fractured gas mains after periods of frost. He said the most effective remedy seemed to be a greater realisation by the public of the need to notify immediately any smell of escaping gas but he asked if the Board had any further advice on the matter.

Mr. George Currier, Deputy Chairman of the Gas Board, said the Board took a serious view of any gassing whether it proved fatal or not. There was in existence an emergency service available day and night to deal with escapes of gas. 'One of the difficulties we are up against is that information often does not reach us soon enough. Too often we find that the escape has been going on for a day or even a week,' he said, 'and it is too bad when people send us a postcard or say they smelt gas a week ago. We ask for the first notification possible.' The majority of gassing incidents were due not to fractured mains, but to a tap being turned on accidentally or turned on and not lighted. Accidents usually occurred to elderly people whose sense of smell was not so keen. Fractured mains occurred almost wholly in the winter and there was a tendency for small pipes to be more affected than pipes of a large diameter. The Minister of Fuel and Power had asked for the problem to be investigated and it was hoped that much more would soon be known about it. In the meantime they were doing everything they could, but they asked for the prompt co-operation of the public.

Following the ordinary business, Mr. H. Johnston, Chief Engineer, gave a talk on 'Natural Gas,' in which he described what he had seen on a recent visit to Italy, and how natural gas was being utilised there.

Record Gas Output in West Midlands

Output and use of gas in the West Midlands continues to go ahead largely because of the severe weather and few records have been set up. Mr. G. le B. Diamond (Chairman of the West Midlands Gas Board) told the Gas Consultative Council in Birmingham on March 28 (meeting under the chairmanship of Alderman W. H. Malcolm) that the volume of gas distributed for the week ended February 27 was 1,908,000,000 cu.ft. This was the worst week for weather and the total showed an increase of 3.2% on the former record figure of 1,849,000,000 cu.ft. established 12 months earlier, when in fact the weather was about 2.5° colder. The amount of coal used for gas making in a week was 81,666 tons. As many as 24 districts broke their existing records for gas production and this occurred not only with large undertakings such as Birmingham, Wolverhampton, Coventry, and Stoke-on-Trent, but was accomplished by the 'little brother' at Upton-on-Severn where there were only 250 consumers. Pressures were maintained in all but a few small districts where improvements were planned, but were not yet completed.

There had been, he said, a big demand for coke and during the four weeks ended March 12, and nearly 140,000 tons were sold. That was an increase of 4,000 tons on the previous highest figure. He also reported that there had been an increase of 4% in coke sales this year compared with the corresponding period of last which had also been a record.

There were only a few days to go to the end of the Board's financial year and Mr. Diamond said it looked as if there would be something like a 7% increase in production and this would probably be the largest in the country.

The heavy rains at the week-end March 26-27, in the Midlands, caused much trouble to various public services. Speaking of what happened at Kidderminster, Mr. Diamond told the Council

iat it was like a miniature Lynmouth. t 6 o'clock on the Saturday evening ie water reached the stores and within n hour it had risen 3 ft. 6 in. and vept coal and coke stocks into the anal. By then an ugly situation was beginning to develop. They got things working again, however, by 6 p.m. on Sunday night, three hours before the supplies in the holder would have given out.

The water put out the retort fires and they were for a time unable to make gas, but only to supply it. Actually, the supply was not impaired at any time, and only one big industrial concern was slightly inconvenienced. Some coal supplies were rushed from Birmingham.

Presentation to Sir George Hamer

Before the Wales Gas Consultative Council commenced its meeting at Swansea on March 25, Miss D. E. Hiskin, Deputy Chairman, on behalf of the members, presented to the Chairman, Sir George F. Hamer, C.B.E., J.P., a silver cigarette box to mark the occasion of his receiving a Knighthood. In his reply Sir George said it was an unexpected and undeserved present because he had done nothing more than what he regarded as his ordinary duty.

Dealing with the quarterly report of the Wales Gas Board, Mr. T. Gale pointed out the Board's decision to close Tredegar and Abertillery gasworks at the end of next summer. He said the people of the area were concerned about the winter supplies of coke. Even now there was a seasonal shortage of soft coke, and they were obliged to use Powell Duffryn hard coke which was not suitable for appliances used in churches and chapels and so on. He hoped that the Board could supply coke from other areas.

The Chairman said the extension of the grid system was bound to create a problem in coke supplies not only in Wales but nationally.

Mr. William Howlett said that within 12 months they would be confined to only four coke producing centres in South Wales—Margam Steelworks, the new power station at Port Talbot, Nantgarw and Pontypool. Mold, in North Wales, was also being closed shortly.

The Chairman pointed out that apart from Wrexham there would be no coke produced in North Wales, and they would probably have to import it from Liverpool. By-products, however, did not come within the Council's province although he was sure the Board would gladly listen to any information the Council had on the subject. However, he did not think it was part of the Council's function to be critical of the Board's policy in dealing with by-products. The Council had recently received a communication from the Coal Consumers' Council and was prepared within limits to deal with such matters.

Also contained in the Board's quarterly report was the information that some 17,645 yards of trunk main had been laid in North Wales since December, but none in the South Wales Grid (Eastern Section).

It was anticipated that the extension of the purification plant at the Grangetown (Cardiff) gasworks would be completed by the end of April, and plans were proceeding for the installation of equipment for accelerated carbonization at Monmouth and Pontypool. During the period December to February, 49 schemes for the supply of gas to housing estates had been examined and approved, providing gas for over 3,700 houses. Nineteen schemes for improvement of supplies in various localities had also been authorised.

Replies to queries from the Council regarding variations in prices were received.

It had been pointed out that there was a difference of 4d. per therm between the charges for domestic consumers of Swansea and nearby Neath, while the difference between the first block charge in Scale 1 of the general scale tariff and that of Scale 8 had also been pointed out by the North Wales Group.

In his reply the Chief Accountant of the Wales Gas Board drew attention to the factors that had to be taken into consideration. They were, he stated, the capital costs inherited by the Board on vesting day and the level of capital expenditure since; the substantial difference which could occur in distribution costs between one undertaking and another, and the comparative levels of consumption, which variations had a substantial effect on the cost per therm. Even when ultimately certain areas in North Wales received gas supplies from the same source there would remain a substantial difference in the level of local costs.

A Tribute to Contractors

Humphreys & Glasgow, Ltd. were congratulated by Mr. W. O. Kirkwood, General Manager of the Sunderland Division of the Northern Gas Board, on March 28 on completing a new 3 mill. cu.ft. per day automatic carburetted water gas plant at the Hendon Works, Sunderland. The plant was urgently needed to meet the increasing demands of consumers. Mr. Kirkwood, who was addressing a Divisional Consumer Committee meeting, said that during December the gas consumption at Sunderland was increasing to such an extent that it was imperative that the new plant should be brought into operation as soon as possible. The contractors, Humphreys & Glasgow, Ltd., were most co-operative and worked day and night with additional labour and eventually completed the erection. By the introduction of temporary electrical wiring they brought the plant into operation on December 22. Gas was actually manufactured on the plant with the site littered with contractors' material, but satisfactory results were obtained.

Mr. Kirkwood reported that every unit in the Division broke its daily gas output record during the January cold spell and yet no gas pressure cuts were made. In addition to meeting the increased demand locally for gas, the Sunderland works for the first time on February 9 transferred supplies to the Tyneside Division. The daily transference was stepped up to a maximum of more than 900,000 cu.ft. a day.

During 1954 the number of consumers in the Division increased by 2,035 to 114,548; 35.3 miles of main were laid (an increase of 7.8 miles over the previous year). New services on housing estates were completed well within the time schedule and no tenant was housed without a gas supply being available. In Sunderland alone mains and services to 1,879 houses were completed during the year, thereby keeping pace with the housing target. Of the new houses completed at Sunderland, 90% of the tenants preferred gas for cooking.

Mr. Kirkwood said that by the completion of linking mains north and south of the town it was possible for Sunderland to pass gas to both the Tyneside and Tees-side Divisions. A new main from Hawthorne to Ryhope would ultimately convey purified gas from the new Murton coke ovens to Sunderland.

Probe into Gas-Coal Famine

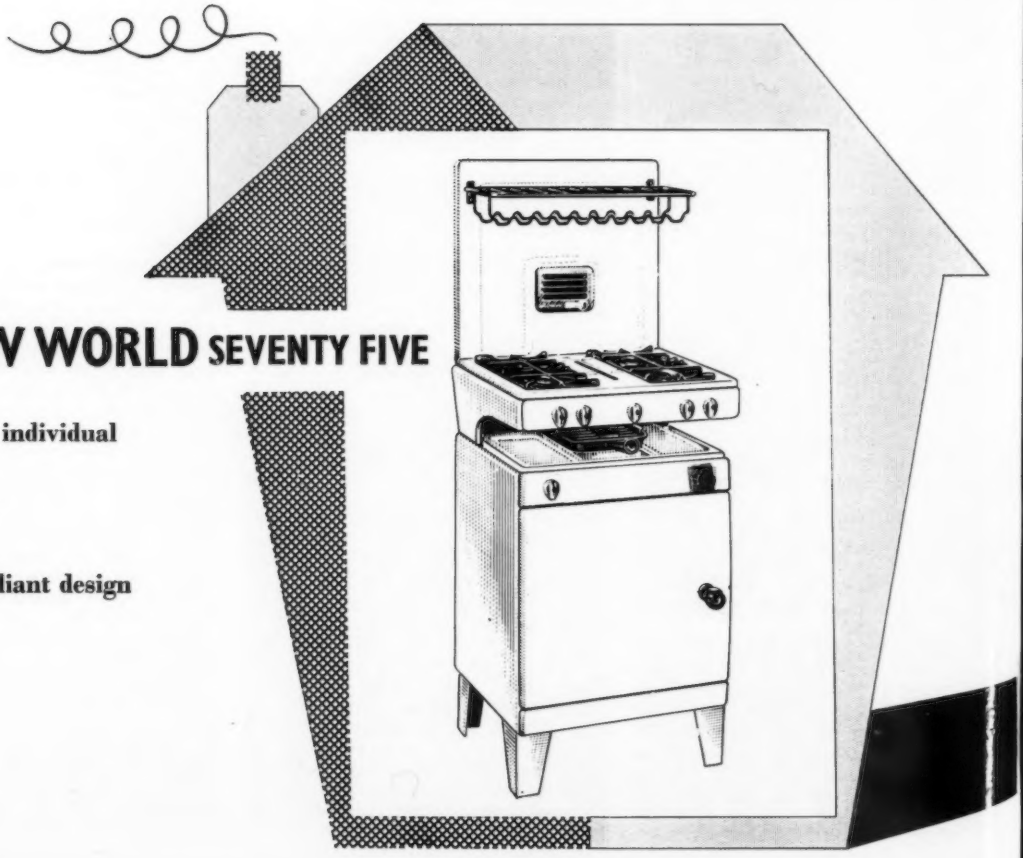
Three times during February 7,500 Bangor (Co. Down) householders were within a few hours of being completely without gas, when coal stocks at the gasworks fell below a 36 hours supply. This was revealed in a report by the Gas Manager, Mr. J. A. Derbyshire, to the Borough Council on March 15.

The report showed that on one of the three occasions, the last day of the month, there was actualy no coal on the ground at the gasworks, and only 50 tons, enough for 24 hours' production, in the overhead hoppers.

On March 1, after it was feared that a gale would hold it up, a vessel arrived at Bangor with a cargo, enabling a continuance of the supply. Mr. Derbyshire commented: 'I am not sorry to see the end of February. In all my experience I have never known anything like this.' In his report to the Council Mr. Derbyshire said that a cargo of Yorkshire coal received about the middle of the month had been of such poor quality that it produced only 18,000 cu.ft. of gas per ton, as compared with the normal 23,000.

The cargo had cost the 'extortionate price' of 107s. per ton, and the undertaking was asking for a rebate of at least £1 per ton from the National Coal Board. Mr. Derbyshire and the Town Clerk were instructed to hold a full-scale investigation into the whole situation.

VALUE FOR MONEY



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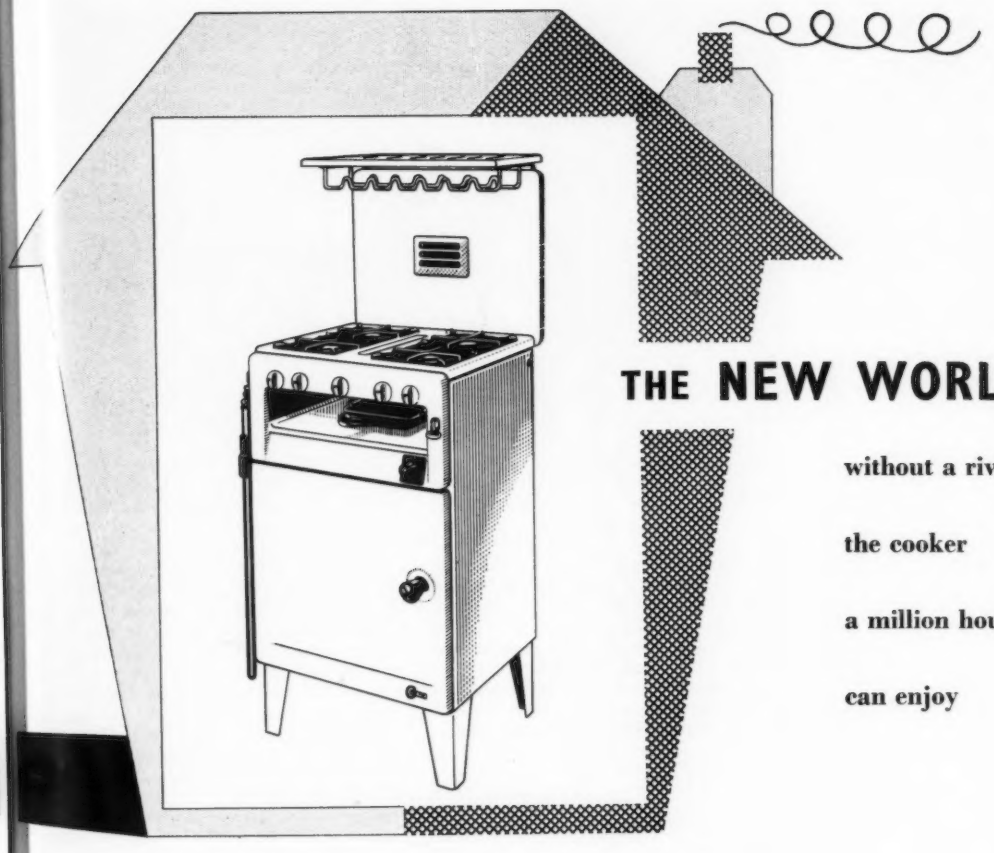

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TRADE NEWS

Thermo-electric flame failure protection

The 120 TE switch is a further development of the 'Monitrol' ½ in. B.S.P. automatic shut-off valve which enables the principle of thermo-electric flame failure protection to be extended to a maximum of 1½ in. B.S.P. The precision electro-magnet of the 'Monitrol' valve has been adapted to operate micro-switches which can be used to control the electricity supply to gas valves, to motors for fans, blowers, conveyors, etc., and to alarms or indicators.

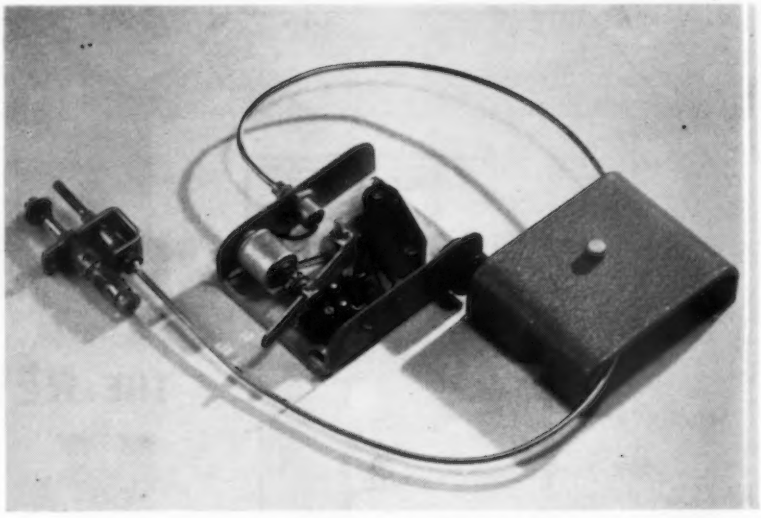
The electro-magnet is supplied with current generated by a thermo-couple which is heated by the pilot burner in the gas appliance which it controls. Failure of the pilot thus causes the electro-magnet to release its keeper (within about a minute) which then operates the micro-switches controlling the electricity and gas supplies to the protected appliance.

The complete unit comprises the electro-magnet switch, a pilot burner with bracket and a thermo-couple, together with pilot tubing and compression fittings.

The 120 TE switch may be used for the flame failure protection of all types of gas appliances in conjunction with the appropriate electrically operated valves. It can be used for single or multiple burner appliances with independent protection of each burner, if required, and with or without separate pilot control.

By using other contacts on the micro-switches additional circuits can be arranged to operate alarms or indicators on flame failure. The main gas valves controlled by the switch could also if required be operated by other controls such as thermostats, pressurestats and time switches where 'on-off' control is required. When magnetic (solenoid) valves are used for this purpose it is preferable to arrange for indirect action through a relay valve to prevent the pilots being extinguished.

The switch device consists of a sensitive electro-magnet and its spring-loaded armature, two 'Burgess' single pole, double throw micro-switches and a spring-loaded operating lever. One micro-switch is operated directly by the spring of the electro-magnet when it is de-energized and the other by the operating lever when it rests in its normal position. Current cannot pass to the main gas valve until the electro-magnet has been energized, reset and the operating lever restored to normal. The pilot burner is of the aerated type with an adjustable air shutter. The burner head is of stainless steel and is specially designed to resist draughts and to eliminate danger of blockage of the ports. Various types are available with different port drillings, for vertical or for horizontal mounting, and with sizes of injectors to suit any type of gas. The thermo-couple is formed from a short rod and tube of special heat resisting metals welded at the tip (where it is heated by the pilot flame) and with concentric copper leads brazed to the other ends. The length of the thermo-couple and leads may be from 12 in. to 72 in. (30 to 183 mm.).—*Monitrol Engineering and Oil Appliances, Ltd., Stechford, Birmingham, 33.*



The 120TE 'Monitrol' switch.

Hydraulically operated shovel

The 'Drott' skid shovel, previously manufactured in the U.S.A., is now under production at Doncaster. Our photograph shows it mounted on a tractor. The mounting brackets, as well as the hydraulic tank and valves, are placed at the back of the tractor to assist the stability of the shovel, the normal equipment of which includes a 'light materials' bucket of 1¼ cu. yd. capacity.

The operating mechanism incorporates a 'hydro-spring' consisting of a hydraulic cylinder enclosed in a coil spring. Any shock force opposing the force of the hydraulic system tends to displace oil from the hydraulic lift cylinders. This displaced oil is channelled into the 'hydro-spring' cylinder, so that the cylinder is extended and the coil spring compressed, an action by which the initial shock is absorbed. The loading height of the shovel illustrated is 9 ft. 11 in. to the bucket hinge pin, and it can dig below ground to a depth of 11 in. The maximum dumping angle is 62 deg. and the overall width of the shovel is 5 ft. 8 in.

The new 'BTD-6' crawler tractor, incorporating a 50.5 B.H.P. engine, gives 10 B.H.P. more than the current production model.

Built into the new tractors are a new heavy main frame, newly engineered gear train, newly designed spiral bevel drive gear and pinion with new bearings of increased radial capacity.—*International Harvester Company of Great Britain, Ltd., Harvester House, 259, City Road, London, E.C.1.*

'Electrothermal bunsen'

Said to heat a test tube in about ten seconds, a new heating apparatus for the laboratory called the 'Electrothermal Bunsen' is now being produced by Baird & Tatlock (London), Ltd. Since the radiation from the heater is directed upwards only, it can be used for such purposes as heating test tubes, crucibles, small flasks and beakers, independent of their shape. By using it inverted, it can provide the heat source for evaporation processes. 'The "Electrothermal Bunsen" can therefore be used for most routine work in the laboratory which is normally carried out by the gas burner,' say the makers.

The apparatus is made of corrosion resistant metal. It consists of a specially formed replaceable heating element mounted in the top of a vertical tube, which forms the supporting case. This tube is provided with air circulation holes in the lower part and a concentric gap left between the heating element and the casing prevents any undue temperature rise. The conical working cavity of the heating element, which consists of a nickel/chrome wire embedded in a refractory aluminium oxide casing, is formed in such a way that the radiant heat is concentrated and directed to the centre top of the cavity, *i.e.*, the position the lower part of a test tube will occupy when the heater is in use. A cowl provided at the top of the unit is designed to deflect heat radiation away from the hand.—*Baird & Tatlock (London), Ltd., Freshwater Road, Chadwell Heath, Essex.*

Foster pyrometer modifications

With the recent introduction of B.S. Code 2082/1954 for disappearing filament optical pyrometers, the Foster optical pyrometer is now available with a high magnification system (X5) to meet the requirements of high precision measurements.

The Lamp Bridge Unit circuit is still utilized but where the instrument is required for laboratory purposes a separate indicator in the form of a 7 in. scale portable or 8 in. edgewise is recommended. A further improvement has been introduced by way of a continuous wound multi-turn rheostat, thus giving an infinite range of adjustment of filament brightness.

An optional extra is the 'ultra-short focus' alternative objective lens which permits the instrument to be focused down to within 3 in. of the object with a further increase in magnification of object. It has proved very popular for measuring the temperature of valve filaments, etc. This class of instrument can be calibrated for any particular scale arrangement between 700°C. and 4,000°C. provided a minimum coverage of 400°C. is specified.

Another version of the industrial pattern optical pyrometer has been introduced which is self-contained. The current is supplied by heavy duty 'leak proof' cells fitted into the handle and actuated by a micro-switch.—*Foster Instrument Co., Ltd., Letchworth, Herts.*

TRADE PUBLICATIONS

Oil and moisture extractor

A leaflet recently produced for Drummond Patents, Ltd., 5, Great Winchester Street, London Wall, London, E.C.2, gives information about their oil and moisture extractor.

Welding aluminium

'Welding Aluminium' is a recently-issued booklet by the Northern Aluminium Co., Ltd., Banbury, Oxfordshire. This brochure gives information on the modern argon tungsten arc and inert metal arc processes, including data on suitable alloys and on weld strength. The latter part of the book consists of tables giving in detail the recommended procedures for various types of weld.

'National sanity'

Newman Industries, Ltd., of Yate, Bristol, seized on the newspaper strike as an opportunity to circulate 14,000 copies of a leaflet describing the dangers of the strike to 'marital relations and national sanity.' A witty series of illustrations proved just how 'precious' newspapers were, and as an afterthought, added that so were electric motors. The leaflet left one to presume this was especially so with Newman motors.

Air blast equipment

Keith Blackman, Ltd., Mill Mead Road, Tottenham, London, N.17, have published two new booklets. Publication No. G.1 is the first of a new series of quarto-size catalogues dealing with the Company's range of industrial gas equipment. Its title is *Air Blast Equipment* and it covers type 3 mixture controller, zero governor, air blast injectors and burners. Publication No. 32 deals with the 'Tornado' range of propellor-type fans which are now being made in sizes from 18 in. to 48 in. diameters.

Refractory concretes

The latest publication of General Refractories, Ltd., Genefax House, Sheffield 10, is a leaflet describing 'Pyrocrete' basic refractory concretes. Aluminous castable refractories, says the leaflet, have been used successfully for a number of years for making special shapes and forming monolithic linings. Although these refractory concretes have many desirable properties, they are not particularly resistant to the action of slag. 'G. R. Pyrocrete' is stated to offer these advantages plus good resistance to slag attack.

Level control

Fielden Electronics, Ltd., of Wythenshawe, Manchester, have sent us an advance copy of a 30pp. booklet produced by their Technical Publications Department entitled 'Level Control—The Application of Electronic Capacity Relays to Industrial Level Indication'. The publication describes in detail the use of a the well-known 'Tektor' for level control of various fluids and powders, in vessels, containers, conveyors and chutes, with schematic diagrams, fixing details and circuits.

Lancashire Dynamo motors

Lancashire Dynamo & Crypto, Ltd., St. Stephen's House, Victoria Embankment, London, S.W.1, have recently issued three new publications. List A.1 gives present prices of A.C. protected and T.E. fan-cooled motors up to 250 h.p. and T.E. motors up to 20 h.p., together with a range of control gear prices. List B.15 supplies full information regarding outputs and dimensions of the new range of interchangeable motors, protected and T.E. fan-cooled types. List J.2 is a revised list of fractional h.p. motors indicating machines in stock for immediate delivery.

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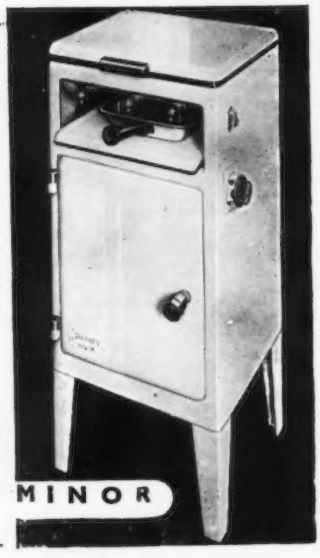

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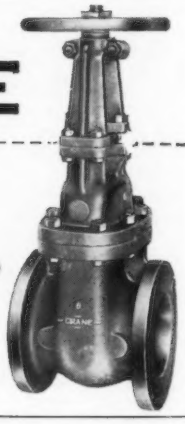

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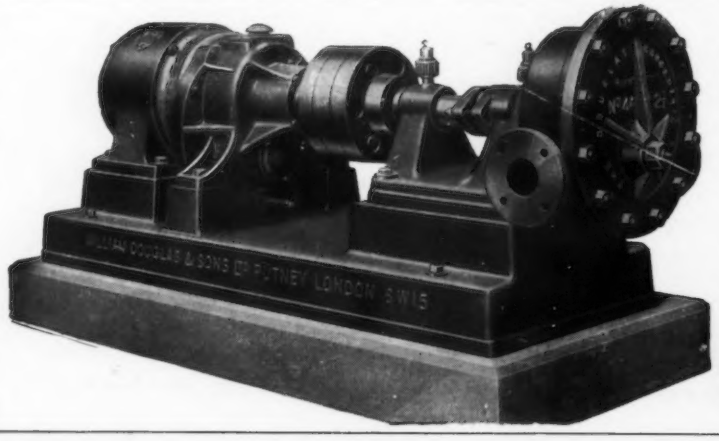
STOP THAT LEAK

See "Gas Journal," Sept. 22, 1954, P.706

FURMANITE ENGINEERING CO. (1929) LTD.,
9, POPLAR ROAD — BIRKENHEAD
Telephone: Birkenhead 1240.

PERMANENTLY SEALS LEAKS
WITHOUT STOPPING YOUR PLANT



"THE DOUGLAS PUMP"

STEAM HEATED FOR TARS.

GOOD SUCTION
SLOW SPEED

WILLIAM DOUGLAS & SONS LTD.
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The latest and best in PORTABLE BELT CONVEYORS

Belt. Of best quality Grade "A" long staple cotton canvas duck with tough rubber cover to suit the duty in question—belt cleated if required.

Support Rollers. All of the ball bearing type with dual synthetic rubber oil and dirt seals and oil reservoir lubrication—return rollers have tough rubber discs designed to clear returning cleats and to assist in keeping the belt clean.

Protection of Working Parts. The motor drives and ball bearings are carefully positioned and really well protected.

Light Construction. Electric arc welding and scientific bracing ensure really adequate strength and robust construction combined with lightness which makes portability a reality.

Discharge Height Adjustment. Hydraulic discharge height adjustment is quick, easy, simple and safe.

WITH AN

Unbeatable Specification

These conveyors are available in a full range of lengths and widths. Ultra light editions are also made, and are particularly suitable for oxide handling duties.

T. & T. Works Ltd., make a complete range of Conveyors and Elevators, and are always glad to advise on the installation of fixed and portable types of mechanical handling equipment. Quotations submitted without obligation.

Write for leaflet GJ352 to :

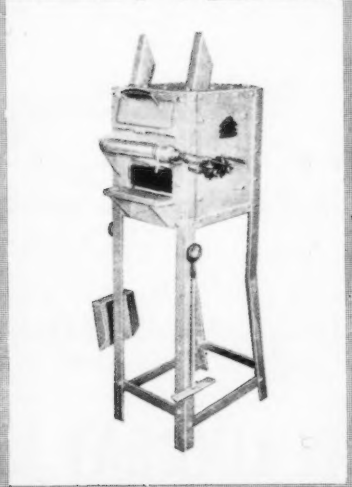
T & T WORKS LTD., BILLESDON, LEICESTER.
Phone: Billesdon 261. Grams: Conveyor, Leicester.
London Office: 39, Windsor House, 46, Victoria Street, London, S.W.1. Phone: ABBey 6085.

T&T

Save Money and Man-Hours WITH

CONVEYORS AND ELEVATORS

BRITISH ALCOSA PRODUCTS



THE PREMIER NAME IN THE INDUSTRIAL GAS WORLD

Pattern B2183 Hot Brass Stamping Furnace

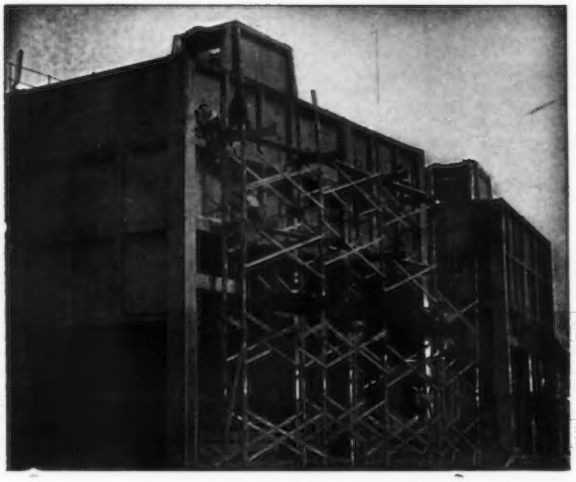
Another British "ALCOSA" product, this furnace is acknowledged to be one of the most efficient obtainable to-day. Its special features include double-deck design and heat resisting iron lining, backed with best quality insulating bricks. Made in five sizes to suit all modern press sizes. These Furnaces are universally used both at home and abroad, and are normally supplied complete with fan units to supply the necessary air blast. Single deck designs also available, Pattern B 2233.

A.H.WILKES & CO.

A SUBSIDIARY OF WILLIAM ALLDAY & CO., LTD.

ALCOSA WORKS, STOURPORT-ON-SEVERN, WORCS.
Tel: Stourport 311-4 *Grams: YADALL, Stourport.*

Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

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PATENT SELF-HEADING BOLT

For repairs to plating etc., etc. where only ONE SIDE of the work is accessible.

901

FROM STOCK in mild steel in eight sizes $\frac{1}{4}$"— 1" each in four lengths

902

CREATES ITS OWN HEAD

Is nearly as strong as an ordinary bolt of the same size.

Descriptive circular and samples, on request. Special sizes, also Lindibolts in non-ferrous at short notice.

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Mansfield Road, Bradford 8, Yorkshire

Telephone: Bradford 41384 (2 lines) *Telegrams: Lindsay Phone Bradford*

Makers of the Lindapter Patent Bolt Adapter

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Calibrated Jets & Injectors
to meet a specification of consumption
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AMAL LTD., HOLDFORD ROAD, WITTON, BIRMINGHAM, 6

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Manufacturers of Best Staffordshire Blue, Brown and Red Engineering Bricks
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DUTCH AND DANISH BOG ORE
SPECIALLY ACTIVATED OXIDE OF IRON
Oxide supplied on loan or sale outright.
Highest prices paid for Spent Oxide
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GAS PURIFICATION & CHEMICAL COMPANY LIMITED
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We know who will win. Please send us details of your wonderfully rapid and reliable Fire Extinguishers—before it is TOO LATE!
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Post now to Nu-Swift Ltd., Elland, Yorks.
—AHEAD OF THE FIRE FIEND'S VISIT!
In Every Ship of the Royal Navy

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For resale to the public, and in bulk for works use.
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SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM.
'Phone: Northern 0989. 'Grams: Reckoners, B'ham.

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NATURAL BRITISH.
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It hits you . . .

. . . these days that the only way to sell an appliance or an electrostatic detarrer is to take the thing into your client's office. Which has its difficulties, as you may agree. But then you obviously have not seen the sort of 3-D slides produced by **Walter King Photographs,** who are specialists at the game. Why not see for yourself? Call, write, or 'phone them at 11, Bolt Court, Fleet Street, E.C.4. (CENtral 2236)

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

THE DOWSON & MASON GAS PLANT CO., LTD. Alma Works, Levenshulme, Manchester, 19, are expanding their activities in the building of many types of INDUSTRIAL FURNACES, and are requiring SERVICE ENGINEERS whose duties will include supervision of erection on site, starting up new installations and contract maintenance. Applicants should give details of experience, technical qualifications, and age.

NORTHERN GAS BOARD

WESTERN GROUP
HOME SERVICE ADVISER

APPLICATIONS are invited for the above appointment, covering the Carlisle, Workington and Penrith Divisions.

Candidates should be qualified in Domestic Science and capable of conducting demonstrations and lectures in Domestic subjects. Duties will also include District Home Service Calls and instruction in the use of gas appliances.

Salary within Grade A.P.T. 4/5 (£268—£464) of the National Joint Council for Gas Staffs. Initial placing according to qualifications and experience.

The successful candidate will be required to pass a medical examination and to join the Board's Pension Scheme.

Applications stating age, qualifications and experience, with the names of two referees, should be submitted by May 7, 1955, to the undersigned.

A. R. CROFT
Group General Manager.

50, Castle Street,
CARLISLE.
April 12, 1955.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION
SENIOR TECHNICAL ASSISTANT
(DISTRIBUTION)—
NORTHAMPTON GROUP

APPLICATIONS are invited for the position of SENIOR TECHNICAL ASSISTANT to the Group Distribution Engineer at Northampton. The commencing salary will be within the range £585/£705 per annum according to age and experience.

Applicants must at least hold the Ordinary Grade Certificate in Gas Engineering (Supply), should have a thorough knowledge of modern methods of distribution, including high and low pressure systems, and be capable of carrying out the detail work in connection with the planning and estimating of new work.

The post is pensionable, and the successful applicant may be required to pass a medical examination.

Applications, stating age and experience and giving full details of training and qualifications, together with the names of two referees, should be submitted to Mr. E. B. Craddock, Group Manager, 45, Abington Street, Northampton, not later than May 6, 1955.

H. B. TAYLOR,
Divisional General Manager.

Leicester.
April 13, 1955.

(Classified advertisements continued on page 198)

APPOINTMENTS VACANT (ctd.)

DRAUGHTSMEN required, experienced in Gas and Chemical Engineering. Pension Scheme. Five day Week. Canteen facilities. Apply W. C. Holmes & Co., Ltd., P.O. Box B.7, Huddersfield.

SCOTTISH GAS BOARD

ALLOA/STIRLING SUB-GROUP—
ALLOA DISTRICT
WORKS TECHNICAL ASSISTANT

APPLICATIONS are invited from qualified persons for the above appointment at Alloa Gas Works. Candidates should be experienced in the operation of continuous vertical retorts, C.W.G. Plant and modern ancillary plant.

The salary will be within Grades A.P.T. 4/6 (Max. £610 per annum) of the National Provincial 'A' Salary Scales for Gas Staffs. The post is superannuable, and the successful candidate may be required to pass a medical examination.

Applications stating age, education, training, qualifications and experience should be sent to the undersigned to arrive not later than Monday, April 25, 1955.

W. M. GLEDHILL,
Sub-Group Manager.

Bank Street,
ALLOA.

SCOTTISH GAS BOARD

ALLOA/STIRLING SUB-GROUP
STIRLING DISTRICT
PRODUCTION ENGINEER

APPLICATIONS are invited from suitably qualified persons for the position of PRODUCTION ENGINEER at Stirling Gas Works.

Candidates should be experienced in the control and operation of continuous vertical retorts, C.W.G. Plant and all ancillary plant.

The salary will be within A.P.T. Grade 9, Provincial 'A' (£655-£755 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should reach the undersigned on or before Thursday, May 5, 1955.

W. M. GLEDHILL,
Sub-Group Manager.

Gas Offices,
Thistle Street,
STIRLING.

SOUTH WESTERN GAS BOARD

DEPUTY AREA SCIENTIST

APPLICATIONS are invited from suitably qualified persons for the post of DEPUTY TO THE AREA SCIENTIST.

The commencing salary will be within the range of £1,300-£1,700 per annum, depending upon experience and ability.

It is essential that applicants should either hold a University First Class Honours Degree in Science, Fuel Technology or possess an equivalent qualification.

The successful applicant will be required to pass a medical examination and to join the Board's Pension Scheme unless he is otherwise ineligible in accordance with the Rules of the Scheme.

Applications, giving full personal particulars and details of training and experience, together with the names of three referees, must be received by the undersigned within twenty-one days of the appearance of this advertisement.

A. H. MORLAND,
Secretary and Accountant.

9a, Quiet Street,
BATH.

WEST MIDLANDS GAS BOARD

BIRMINGHAM AND DISTRICT DIVISION
DRAUGHTSMAN,
SWAN VILLAGE GAS WORKS

CANDIDATES should have completed a Drawing Office apprenticeship and have reached at least Ordinary National Certificate level in Mechanical or Civil Engineering. The post offers opportunity for experience over a wide field of engineering activity.

The salary will be within Grade 5 (£500-£580 per annum) of the National Salary Scales.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications, stating age, experience and qualifications, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham, to reach him not later than fifteen days after the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

BIRMINGHAM AND DISTRICT DIVISION
DRAUGHTSMAN,
DIVISIONAL ENGINEER'S OFFICE,
SALTLEY, BIRMINGHAM

CANDIDATES should hold a Higher National Certificate in Civil and Mechanical Engineering or equivalent qualification, and have had considerable experience in an Engineering Drawing Office, including plant layout. A knowledge of Gas Works plant will be an advantage but is not essential.

The salary will be within Grade 8 (£625-£705 per annum) of the National Salary Scales.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications, stating age, experience and qualifications, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham, 3, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

EASTERN GAS BOARD

NORWICH DIVISION
GREAT YARMOUTH GROUP
HOME SERVICE ADVISER

APPLICATIONS are invited for the above position. Candidates should preferably be qualified in Domestic Science and be experienced in the use and sale of domestic cooking and other appliances and in the organisation of cookery demonstrations, lectures, and district home service calls. A knowledge of commercial catering would be an advantage.

The salary will be in accordance with A.P.T. Grade 5 (Female) Provincial 'A' (£400 to £464 per annum), and initial placing depending on age and experience.

The successful candidate will be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Eastern Gas Board Staff Pension Scheme within six months from taking up the appointment.

Applications giving full details of training, qualifications and experience, together with the names of two referees, should be addressed to the General Manager, Norwich Division, and be received within twenty-one days of the appearance of this advertisement.

RONALD A. WESTON,
General Manager.

Eastern Gas Board,
1, Yarmouth Road,
NORWICH, Norfolk.

FUEL TECHNOLOGIST. Required, young graduate, who has completed National Service, as trainee in Steelworks. Single man preferred. Degree preferably in science, but no practical experience necessary. Good prospects for suitable candidate. Apply: Education & Welfare Officer, Richard Thomas & Baldwins, Limited, Ebbw Vale, Mon.

CHEMICAL ENGINEER/GAS ENGINEER required by The Power-Gas Corporation Ltd., Stockton-on-Tees, for work in Chemical Engineering design department. Graduate or equivalent qualifications preferred. Age up to 30 years. Permanent position, pension scheme. Apply stating qualifications and experience to Staff Personnel Officer.

GAS Engineering Contractors in North of England have vacancies for:—

TECHNICAL ASSISTANT/ESTIMATOR.—Applicants should have technical background, sound general engineering experience, be capable of preparing schemes and quantities.

DRAUGHTSMAN with sound general engineering experience.

Permanent positions—pension scheme. Full details training, experience, salary to: No. 235, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

NORTH WESTERN GAS BOARD

WIRRAL GROUP
TECHNICAL ASSISTANT (PRODUCTION)

APPLICATIONS are invited for the above pensionable position at a salary within Grade A.P.T. 5 (£500/£580 per annum).

Applications, giving details of education, training and experience, together with the names of two referees, should reach the General Manager, N.W.G.B. (Wirral Group), Hind Street, Birkenhead, within 14 days.

PLANT FOR SALE

CONNELL OF COATBRIDGE
BOILERS FOR DISPOSAL EX STOCK

ECONOMIC

Hudson Patent Economic Boiler 18 ft. long by 8 ft. 6 in. dia. with two side banks of tubes each 24 ft. long by 4 ft. 8 in. dia. Working pressure 150 lb. per sq. in. Evaporation 14,000 lb. per hour.

Paxman, horizontal, economic multitubular Boiler 14 ft. long by 8 ft. 7 in. dia. by 160 lb. working pressure. Evaporation approx. 7,990 lb. per hour from feed at 212°F.

LANCASHIRE

One—24 ft. long by 9 ft. dia. by 190 lb. working pressure. Hand fired.

One—21 ft. long by 7 ft. 6 in. dia. by 100 lb working pressure. Hand fired.

VERTICAL

Blake vertical multitubular, coal fired 17 ft. 6 in high by 7 ft. dia. by 160 lb. working pressure Evaporation approx. 3,000 lb. per hour.

Cochrane No. 10 vertical multitubular, coal fired, 12 ft. 3 in. high by 5 ft. 6 in. dia. by 100 lb working pressure. Evaporation approx. 1,620 lb. per hour.

Vertical Coal Fired, Cross tube, 12 ft. by 6 ft. by 100 lb. working pressure.

Vertical Coal Fired, Cross tube, 8 ft. 6 in. by 4 ft. by 100 lb. working pressure.

Vertical Coal Fired, Cross tube, 8 ft. 5 in. by 4 ft. 6 in. by 120 lb. working pressure.

Vertical Coal Fired, Cross tube, thimble tube, 8 ft. by 3 ft. 9 in. by 80 lb. working pressure.

Vertical Coal Fired, Cross tube, 7 ft. 6 in. by 4 ft. 0 in. by 100 lb. working pressure.

Cochrane, Vertical, coal or gas fired, hot water boiler, 6 ft. by 3 ft.

Scottish Agents for Riley Boilers and pressure Vessels.

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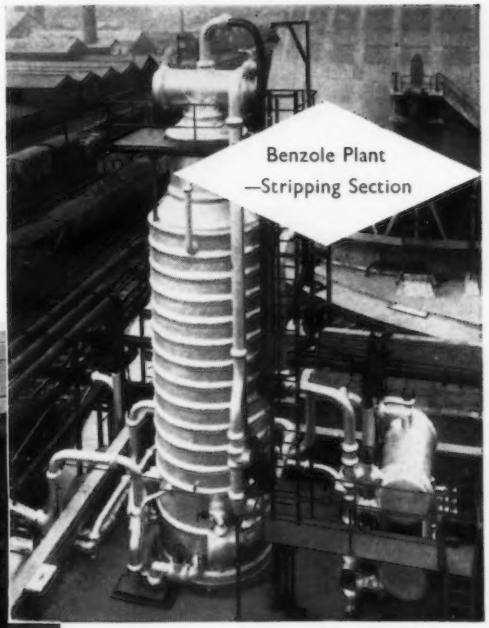
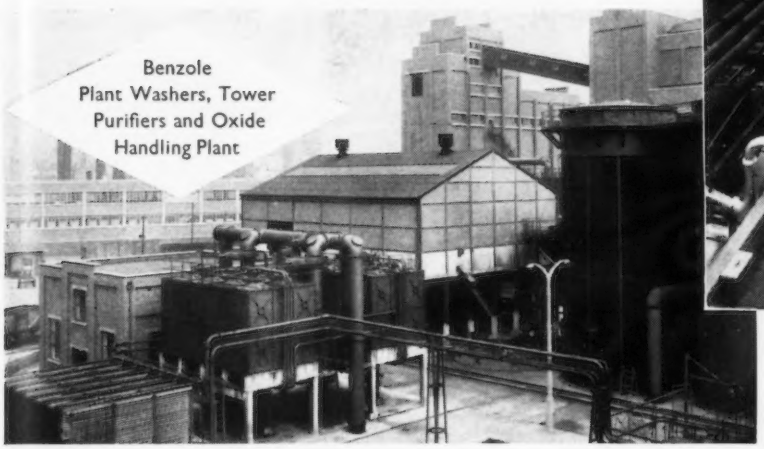
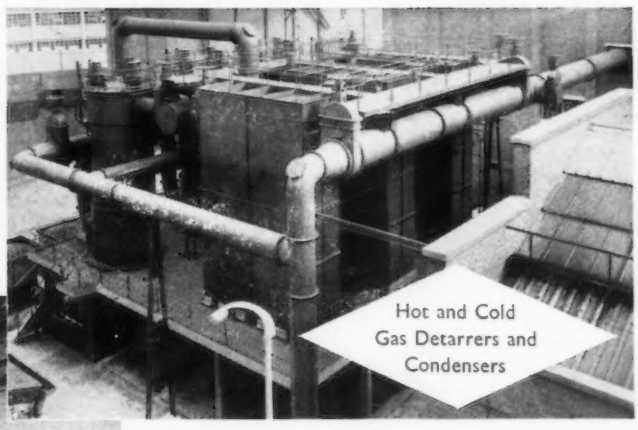
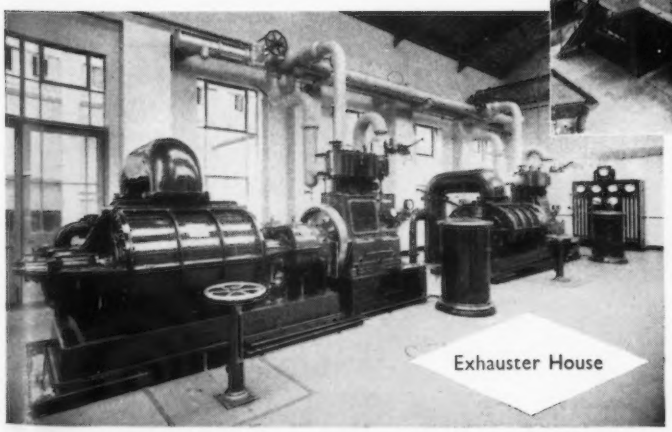
A major contribution





to the all-round efficiency of the new Gas Works at Stoke-on-Trent





Illustrated is some of the Holmes plant, designed to treat 10,000,000 cu. ft. of gas per day. By kind permission of the West Midlands Gas Board.

FOUNDED 1850 HOLMES HUDDERSFIELD

W. C. HOLMES & CO. LTD

TURNBRIDGE · HUDDERSFIELD

C4565

industrial gas compressors

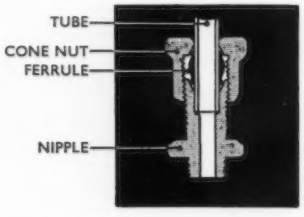
FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.

DIRECT COUPLED COMPRESSORS (see *illustration right*) *are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".*
CAPACITY RANGE: *100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.*

TYPE 4 COMPRESSORS (*not illustrated*) *are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.*
CAPACITY RANGE: *500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.*
AREA OCCUPIED: *from 9¼" x 16½" to 61" x 27".*

DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. *Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.*



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MILL MEAD ROAD, TOTTENHAM, LONDON, N.17
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BRANCH OFFICES: AT MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW, NEWCASTLE-ON-TYNE, PENARTH near CARDIFF, AND BELFAST

serving to burn

Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.

LEFT: "Fishtail" type burner *with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies.* ***Size Range:*** *1", 1¼", 1½", 2" and 2½" outlets.* ***Capacity Range:*** *45-280 cub. ft. of gas per hour.*

Brass non-blow-off head types: *deal with 5 to 10 cub. ft. of gas per hour.*

Stainless steel, "F" type head, burner: *deals with 8 cub. ft. of gas per hour.*

Perforated head type burner: *deals with 10 to 15 cub. ft. of gas per hour.*

INDUSTRIAL GAS EQUIPMENT

524

SCIENTIFIC LUBRICATION

for the GAS INDUSTRY

Long years of experience enable us to offer a complete range of lubricants of the highest quality.

TECHNICAL SERVICES INCLUDE:—

Comprehensive Lubrication Surveys by Expert Lubrication Engineers and Chemists—without obligation.

Contracts on a Thermal Output Basis are available
Consult the leading suppliers to the Industry

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WILLIAM WALKER & SONS (HANLEY) LTD.
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INTERMITTENT VERTICAL CHAMBERS

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GC4

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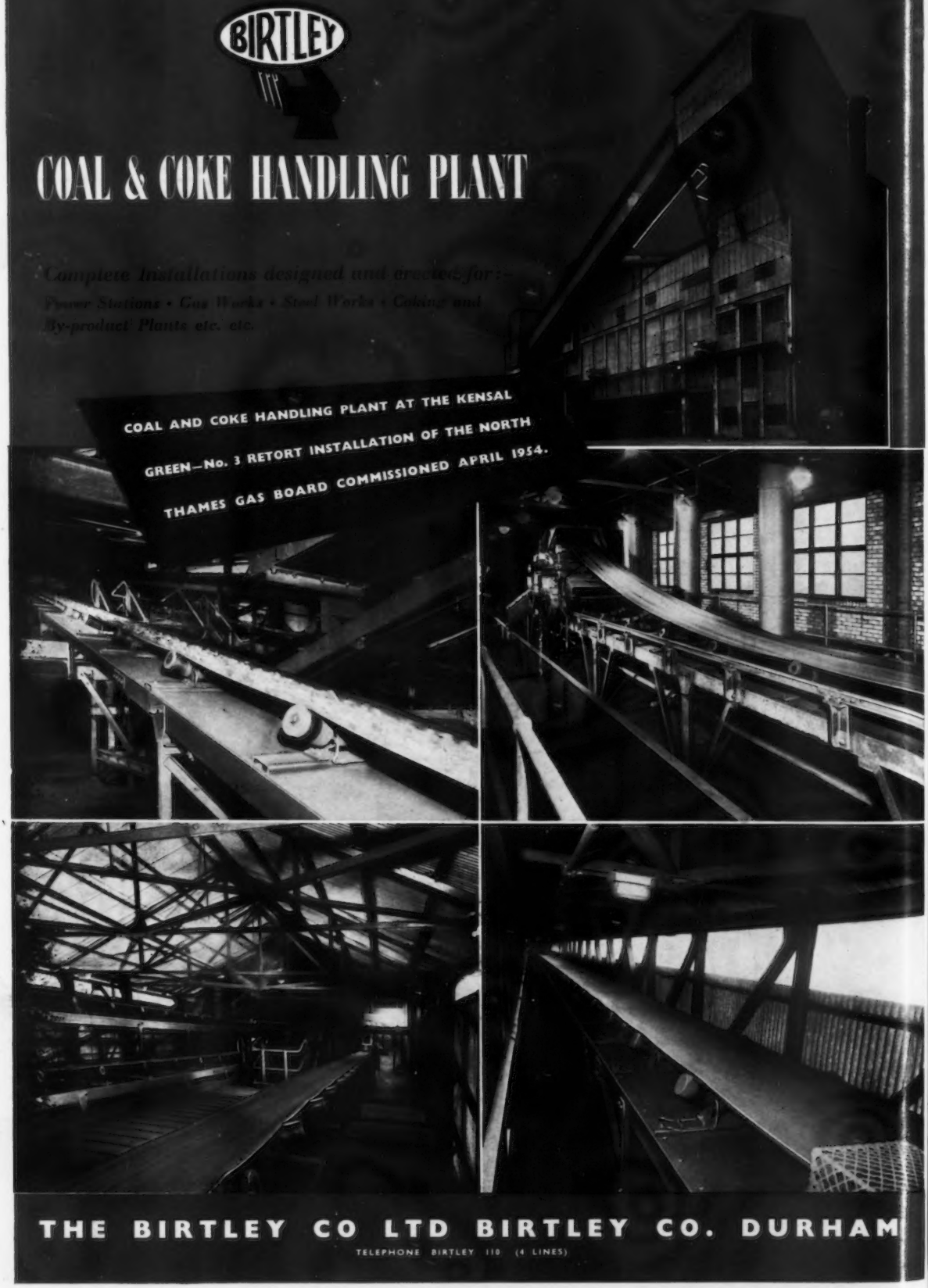
COAL & COKE HANDLING PLANT

Complete Installations designed and erected for:—
Power Stations • Gas Works • Steel Works • Coking and By-product Plants etc. etc.



COAL AND COKE HANDLING PLANT AT THE KENSAL GREEN—No. 3 RETORT INSTALLATION OF THE NORTH THAMES GAS BOARD COMMISSIONED APRIL 1954.

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